RAILROAD GAZETTE

FRIDAY, SEPTEMBER 11.

Progress in Boiler Construction.

We give below the remainder of the report made to the Master Mechanics' Association by its Committee on Boiler Construction; the first part of the report was published last week:

FLUES.

Steel flues were but slightly used in 1870 (p. 105), and their use at present is not common. They are thin, give a lengthened service, and in the hands of good workmen are (with borax as flux) readily pieced and rewelded to iron ends. Difficulty in rewelding was the chief defect mentioned to their discredit in 1873 (p. 43). The statement of Mr. Robison and Mr. Eddy in 1873 (pp. 43–4) that brass flues transmitted heat more freely to the extent of justifying—as economical—the use of the more expensive metal, remains unproven to date, and after much experimenting the almost uniform practice of this continent in the use of iron and steel flues contradicts it.

The manner of securing flues is now an almost uniform practice, viz., parallel, expanding with roller expander and beading the ends over; the fire-box end being encircled by a ferrule $\frac{1}{16}$ in. or less thick, of soft iron or copper, preferably brazed to the end of the flue; but the spacing of flues varies widely, the best evidence going to show economy in the wider spacing up of ⅝-in. water way, and Mr. Faries, of the Atchison, Topeka & Santa Fe, in 1875 (p. 59), and Mr. Adams, on the North London Railway, make a good show for 1-in. spaces.

Discussion.—Mr. SPRAGUE questioned the wisdom of brazing thimbles to a flue. He had abandoned the practice and thought it labor lost. Mr. SETCHEL doubted this. The great point was to dispense with joints. Mr. LAUDER thought with good water the usual practice was good enough, but with bad water brazing might be essential.

To an inquiry as to who was using steel flues, Mr. SETCHEL said they had used a few sets with poor success until they began using *safe ends*, about 6 in. long of the very best iron, No. 10, W. G., and then they did well.

HEATING SURFACE.

Mr. Towne in 1872 (p. 64) said (and it was not disputed) that the flues were acknowledged the most effectual heating surface of the boiler. This view is not held by those who, going to the opposite extreme, say with the Gauge Commissioners that every square foot of fire-box is capable of evaporating 2 cubic feet of water per hour; experiment having shown that an excellent evaporation for the whole surface (fire-box and tubes combined) per square foot, is ½ cubic foot per hour, or, for 1,000 ft. of surface, 125 cubic feet, or 940 gallons (U. S.) The most common assumption is that the relative values of the flue and fire-box surfaces are as 1 to 3, but Mr. Langridge, in a paper before the "Institute of Civil Engineers," analyzed the actual work of 19 locomotives, from which he found the hourly evaporation from the fire-box surface was as 11.7 to 1; the total average tube evaporation was $0.1365 \times 11.7 = 1.597$; or, in other words, with common sizes under ordinary work and with ordinary blast pressure, the fire-box evaporated one-fifth and the tubes four-fifths of the water; consumption of fuel per square foot of grate varying from 38 to 157 lbs., the average being 83 lbs. One of his conclusions was that a large increase of heating surface in proportion to the fuel burned only slightly increases the economical effect. In fact, within the limits of common practice in locomotives, the economic effect is in proportion to about the *fourth root* of the heating surface. For instance, an increase in heating surface from 915 ft. ($\sqrt[4]{} = 5.5$) to 1,296 ft. ($\sqrt[4]{} = 6.0$), or of 381 ft., would only give an increased economy of one-eleventh or 9 per cent., for the same consumption of fuel. The case, of course, would be different if both engines were being forced heavily, or a greater amount of coal being burned per foot of grate. Then the greater absorbing surface would give a higher relative economy.

BLAST PRESSURE.

M. O. Bussé analyzed some experiments made on the Northern Railroad, of France, with an old locomotive boiler, having 76½ square feet of surface in fire-box and 717½ square feet in 125 tubes 12 ft. long, 1⅝ in. diameter. The tubes were cut off by bulkheads into four sections of about 3 ft. long and having nearly 180 square feet of surface. The evaporation was as per table below, the blast-pipe in smoke-box being supplied from a second boiler. One noticeable fact is that the vacuum in smoke-box, measured in inches of water, is increased 400 per cent. without increasing the total evaporation of water 100 per cent. The greater consumption of fuel and the greater speed of smoke due to the highest vacuum improves the evaporative efficiency of the tubes at the outer end 200 per cent., but at best their efficiency is not high, the last 3 ft. length having but from one-fifth to one-sixth the evaporative value of the first length.

Total Evaporation, in Pounds of Water per Hour, of Various Parts of the Locomotive Boiler—Experiments of O. Bussé.

Vacuum in smoke-box; in. of water.	Sections in barrel, commencing at fire-box end. 1st.	2d.	3d.	4th.	Tubes.	Totals—Fire-box	Grand total.
0.78	57	26	14	8	107	253	360
1.56	82	44	23	15	165	300	465
2.34	118	48	38	25	230	410	640
3.12	105	55	24	25	220	461	681
3.90	149	68	46	30	294	417	712

Percentages of Total Evaporation (ignoring decimal points):

Vacuum, in. of water.	Sections in barrel. 1st.	2d.	3d.	4th.	Tubes.	Totals.—Fire-box.	Grand total.
0.78	15	7	3	2	30	70	100
1.56	17	9	4	3	35	64	100
2.34	18	7	6	3	36	64	100
3.12	15	8	5	3	32	67	100
3.90	21	9	6	4	41	53	100

The pounds of water evaporated per square foot of heating surface per hour were:

Vacuum, in. of water.	In fire-box.	No. 1.	No. 2.	No. 3.	No. 4.
0.78	3.30	.32	.14	.08	.05
1.56	3.92	.45	.24	.12	.08
2.34	5.30	.65	.26	.21	.14
3.12	6.02	.58	.30	.10	.14
3.90	5.45	.83	.38	.25	.16

These comparatively small quantities should be compared with the 18 lbs. of water per square foot of surface (tubes and fire-box) evaporated in torpedo boilers with 6 in. of water pressure in stoke-hole.

It is quite possible that testing the evaporation of independent lengths of the boiler by the use of bulkheads gives a misleading result, as the partitions seriously interfere with the circulation, circulation being a far more important factor in the transmission of heat than either the nature or thickness of the metal through which heat is transmitted.

With Mr. Bussé's figures should be compared the government experiments carried out with Mr. Thorneycraft's torpedo-boat boilers of locomotive type, having air pressure in stoke-hole. These boilers have 620 square feet of heating surface, of which 56 ft. is in fire-box; grate surface, 18.4 ft.; barrel, 53 in. diameter; tubes, 205 of 1¾ in. diameter and 6 ft. long.

Torpedo-Boat Boiler Tests.

Air pressure in stoke-hole, in. water	2	3	4	6
Air pressure in ash-pit, in. of water	1.47	2.29	3.26	5.25
Air pressure in furnace, in. of water	1 35	1.87	3.0	4 33
Temperature of feed water, Fahr.	53.5°	57°	54°	56°
Temperature in furnace, Fahr.	1.037°	1.192°	1.260°	1.444°
Steam pressure above atmosphere, lbs	117	117	115	115
Coal consumed per hour, lbs.	925	1,177	1,472	1,815
Coal consumed sq. ft. of grate, lbs.	49	62	78	93
Water evap'ed per hour, total, lbs.	6,530	7,770	9,320	10,340
Water evap'ed per lb. of coal, lbs	7.06	6.6	6.33	5.97
Do. reduced to equiv't at 212° F. from 100°	7 61	7.08	6 81	6.41
Evap'n per hour per sq ft. of heating surface	10.8	12.9	15.5	18.0
Duration of experiment	2 h.	2 h. 7 m.	1 h. 39 m.	1 h. 27 m.

Nixon's navigation coal; 9 per cent. ashes.

The results would have been more interesting had lower pressure than 2 in. of water been used, as even at half engine power these boilers are overworked, but the influence of pressure on evaporation, combustion and temperature is clear, and the experiments showed that tubes absorb seven-tenths, and fire and grate one-tenth of the initial air pressure. The pressure in chimney was about equal to the pressure of atmosphere.

Additional experiments were made to see if the ordinary mode of combustion with steam blast in chimney approximated in efficiency to pressure in stoke-hole, with the result of showing that the steam jet was very wasteful, usually only increasing consumption on grate 40 to 50 per cent. over natural draft, with an increase of efficient power not exceeding 15 per cent.

Turning fan air-blast of 12 in. pressure and more into chimneys and using locomotive nozzles and split-rings from 2 to 5 in. in diameter, the result was poor, the best show being made with a 3½-in. nozzle; but even then not half of what was obtained with 2-in. pressure in a stoke-hole. This result accords with Mr. Langridge's statement that the blast-pipe, considered as a motive power, is very wasteful, as but from one-eleventh to one-twelfth of the power escaping is utilized in drawing air through the tubes.

It should be noted that an increase of blast pressure from 2 to 6 in., or 300 per cent., did not increase the consumption of coal per square foot of grate quite 100 per cent., and the value of the fuel is reduced 15 per cent.

HOLLOW STAYS.

The difficulties in the manufacture of hollow stays and the unvarying supply of air admitted, although the supply should be adjustable to varying demands of the fuel, have not encouraged their use (see 1872, pp. 19, 61, 62; 1877, pp. 117, 120, 130; 1878, p. 16; 1879, p. 80), and a fire-hole deflector with adjustable door or diaphragm still proves the better plan for admitting the air requisite above the fuel.

Discussion.—Several spoke in favor of hollow stays, Mr. SETCHEL pointing out that their purpose was to prevent smoke more than fuel economy, and that experience on the Pennsylvania and Ohio & Mississippi showed they did this. Mr. HATSWELL had found 5 or 6 large 2-in. flues through the back end of the fire-box above the dead-plate very effectual both in saving smoke and fuel.

SCALE.

After continuous reports of non-success with chemical compounds to remove or prevent formation of scale, the recommendations of former committees (see 1873, p. 18, and 1874, p. 43) are narrowed down to the use of pure water and providing open surface storage reservoirs to secure it, and washing boilers out when cold with water of heavy pressure to detach all mud and scale; however, in 1869 (p. 49) there is a report that "Hays' battery" will soften scale after formation. Batteries, although perfect in theory, have heretofore been found deficient soon after they have been put to work, through the mechanical difficulties of getting pure zinc and keeping it in clean metallic contact with some point of iron, oxide of zinc rapidly forming at the junction, thus breaking the contact absolutely necessary for a galvanic couple and electric current. The zinc is well hammered at a definite heat, which changes it from a crystalline friable metal to a malleable one, and insures its long existence in an efficient condition. This, in the ocean service of the Canadian Mail Line, has stopped the further action of corrosion and loosened old scale. We have not to fight against salt or fatty acids in locomotive boilers, but its success in bad marine boilers justifies experiment being made with it on locomotives. The theory explaining its action in detaching scale is, that at the surface of the iron plate (the negative pole) water is slowly decomposed and the hydrogen gathers and forces off the new scale as soon as it is thick enough to offer resistance. Of all boiler-plate preservatives used by the Admiralty, zinc has proved to be the most effective. It has been used in rolled up slabs 12 in. × 6 in. × ½ in., one slab per 20 I. H. P., or one square foot of slab to two feet of grate surface.

PITTING.

Pitting can be stopped and the plate brought into a healthy condition by scraping the affected spots and cleansing the surface with a strong solution of soda or petroleum, to remove any grease or acidity, and then coating with a thin wash of Portland cement. Even so simple an expedient as filling the cleansed pit holes with red lead has, in marine practice, proved quite effectual in preventing any further waste. And as corrosive and pitting action are apparently increased by the partial absence of oxide or scale on the plate, and the whole of it cannot be kept on, because of the handling the steel receives in boiler making, the better and certainly the safer practice is to remove it completely, by washing with a very weak acid solution, protecting the raw metallic surface by rubbing over with black oil (still refuse). Such a surface is less liable to obscure galvanic action, and as long as it is kept clean will certainly transmit heat and deliver it to water more freely (see R. Wells' experiment, 1876, p. 80). That there was less pitting in steel than iron boilers was Mr. Sedgley's opinion (1877, p. 54), and recent experiments and extended experience and observation tend to confirm this statement, except when local galvanic action is started, and galvanic action will not start, or at least will not give any trouble, when like metals are acted upon under similar conditions; therefore, iron rivets should not be used with steel plates.

FURROWING AT JOINTS.

This subject has been much discussed (1872, p. 56; 1877, p. 61; 1878, p. 73, etc.), with the resultant opinion that furrowing was due to chemical or corrosive action on a surface or point at which expansion or alteration of shape was localized. In addition to the cause before given for this localization, we would call attention to the injury done to barrel plate at the line of rivet holes in passing it through the rolls after drilling or punching, the lessened resistance there permitting the end of plate to make a decided set, instead of bending uniformly to curve. Such rough measures are occasionally used by careless workmen in bringing the bent edges back to true curve as to make a good opening at this point for acids to work upon.

COVENTRY BOILER.

Experiments have been carried out on the Chicago, Rock Island & Pacific Railway, with the "Coventry boiler" (illustrated by Plate 27 A, p. 42, 17th report), and Mr. T. B. Twombly, under date of March 12, writes the committee as follows:

"In reply to your inquiry regarding 'Coventry boiler,' will say that this engine ran some 2,000 miles on our road. I did not subject her to any scientific tests, but ran her for 600 miles on freight service against our engine No. 291, carefully weighing the coal to each engine and having them pull trains of 30 loaded cars each way—cars of as nearly same weight as possible. The result appears on the small blue print inclosed, which shows that our engine ran 36.98 miles to a ton of coal, and the 'Coventry' 33.24 miles.

"The engine was handled by one of our engineers who knew the road perfectly, and although he might have done somewhat better had he been more acquainted with the engine, yet I consider this a fair practical test. I think it reasonable to presume that no amount of fine handling would cause her to show any decided advantage over our engine.

"The 'Coventry boiler' is 60 in. in diameter, placed on an ordinary eight-wheeled engine with cylinders 17 in. by 24 in., and weighs something over 40 tons.

"Our engine No. 291 has a boiler 50 in. diameter, cylinders 17 in. by 24 in. and weighs 36 tons.

"I made no investigation into her evaporation. A man employed by Mr. Coventry put a pyrometer in her front smoke-box close to the flue sheet, and he reported 900° of heat when engine was working hard, dropping down to 400° when working lightly. Of course I do not know how accurate this is.

"She ran for a week or two on one of our suburban trains, doing very good work and throwing very few sparks. She is a nearly perfect spark-arrester. She ran one trip on one of our heavy express trains (12 cars), and lost time each way. She is not what would be called a free steamer.

"It requires considerable more work in the round-house to keep her cleaned out than it does with the ordinary boiler, as her back smoke-box fills with cinders, which must be shoveled out of a small door, and her flues seem to fill up very fast.

"The original cost and cost of repairs will be considerably more than on present style of boiler, and altogether I do not think that, as at present constructed, her advantages will compensate for the increased trouble and expense."

Contributions.

Piece-Work in Railroad Shops.

TO THE EDITOR OF THE RAILROAD GAZETTE:

My communication to your paper some few weeks since, in which I cited some of the obstacles which would be found if the "piece-work" plan were attempted in locomotive shops generally, has, I notice, drawn replies from one or two parties who have tried it with success, it would appear.

Some few years back I was connected with a road as machine shop foreman, and it was proposed to adopt, as far as possible, this system, but it was abandoned without trying, owing to the apparent difficulties which appeared.

The first obstacle met with was the price to put on difficult work. To make a price, the time that the job occupied had to be looked up. The time had been kept by a time-keeper, who took it each evening from the men, as is the general practice. It at once became apparent that no correct price could be based on time taken in this way, from the fact that machinists generally carry the time in their heads and give it in, being particular only that it foots up the full number of hours worked each day, thus involving an element of guess-work and uncertainty. This shop, like many others, had no clock, and many of the machinists had no watches. Machinists, too, have a habit of taking time from a job on which they have had bad luck, and used too much time, and dividing it up on other jobs on which they have made better progress. It may be argued that this state of affairs (which is to be found in seven out of ten shops) ought not to exist, that the foreman ought to know that time is given in correctly, that he ought to have a clock in his shop, etc., etc., but if those who take this ground will act as foreman for a time in the average shop they will find their time so fully occupied with the thousand and one matters which constantly force themselves upon them, that they will be only too glad to have the work out at all, without attempting to remember what amount of time each of 80 or 100 men put on each of 100 or 200 jobs daily. If he wants a clock in his shop, he must in many cases buy it himself, "the company is too poor." But be this as it may, it was found that no correct basis could be made by looking up back time-books.

The proper thing, then, was to start in again and watch some job—such as a driving-box being bored out—in order to obtain the correct time. This would have had to be done without the knowledge of the men, as they would have, in their own interest, gotten in a little extra time. To have obtained this correct time for the many different jobs which could be brought under the piece-work system would have required probably a year or more, as it was deemed necessary to get the average of at least five different men, and it is not a convenient matter always to change men or work on lathes, etc., in order to obtain data for this average. Times were good then, work was plenty, and men left for the slightest difficulty, and the obstacle of a row with the men loomed up when the piece system was to be sprung on them, as is always the case when any innovation is made on ordinary practice. In addition to this, some friction and loss of time would have occurred in starting the system, and that road could not afford to have its work put back an hour. Then it

was seen that as all work could not be done under the piece-work system, the time would have to go in partly under that system and partly under the day's pay system. This would have required a change, or more work on the books. That road had engines of different sizes, like many others, and it would have required a classification to have equalized matters, as it would have required more time to have bored out a 7½ in. driving box or have fitted it than one of 6 in., or to have faced down a valve on a 19 in. Mogul or a 20 in. "hog" than to have performed the same work on a light 15 in. accomodation passenger engine. The system which appeared to have advantages worth trying at first glance, soon developed such a number of heads, sub-heads, classifications and differences, that it was seen that in that shop it would be impossible to gather the necessary amount of exact data on which to base correct and equitable prices, inside of two or three years possibly, as it was not desired to launch the system until it was complete and the possibility of disputes and differences with the men was made impossible by the correctness of the prices.

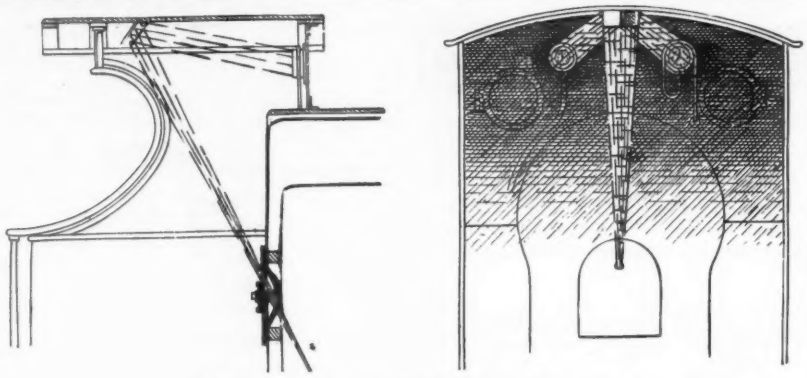
Foremen had all they could attend to and no time to devote to the matter, and thus, as difficulty after difficulty appeared, the enthusiasm in the matter dwindled away, and the rush of every-day and pressing work finally buried it out of sight. And this, I predict, will be the result in the majority of attempts to inaugurate the piece-work system in locomotive repair shops. This system, undoubtedly, has advantages that would pay to adopt, but the time and labor required to build the foundation for it is such that it will "die in the borning" in the majority of cases, and it is evident that unless it is *complete* before it is started, the dissatisfaction and rows with the men will make it a source of vexation and trouble. From my rather light experience with this system, save in studying over the difficulties in the way, I cannot better close this hurried letter than to quote "N.'s" closing remark, in his communication on this subject in your issue of Aug. 14: "A good system of piece-work is not easily inaugurated." And if any one doubts it, let them try it.

FRANK C. SMITH.

[We fail to see any argument against the piece-work system in Mr. Smith's letter. Any one who expects to make a change from days' wages to piece-work without any trouble and all at once deserves to fail. It would probably be utterly impossible to introduce the system complete at once, where the benefit of the experience of others cannot be had. Prices in many cases will not be established for years; neither are wages, but the process has been so slow and gradual that most of us ignore it. If a price is fixed which gives the average workman much greater wages than other men of similar skill get, there will be a rush of men to get jobs of that kind, and the prices will come down. If any average workman cannot make wages at the prices, no one will take the job, and prices will have to be raised. If any kind of work is too irregular to have a fixed price as piece-work, it will have to be done by days' work, just as in every printing office where the bulk of the work is piece-work, there are some hands working by the day. For one to set the experience of men who once intended to adopt the plan, but were unwilling to take the trouble, against that of those who have taken the trouble and found their advantage in it, is absurd. What is needed is to point out what it is practicable to do and what impracticable by piece-work; what are the main difficulties and how they have been surmounted. The opinions of those who have tried the plan faithfully and failed (if such there are) will be valuable and serviceable; but we shall learn nothing worth knowing from those who have not had the heart to try it. If it costs a great deal of trouble for several years, it may still be worth infinitely more than it costs.—EDITOR RAILROAD GAZETTE.]

Setting Eccentrics on Crank Axles.

The most correct method of setting eccentrics in position on the crank shaft is to put the wheels under the engine, connect all the parts, and turn the eccentric around on the shaft until the right amount of lead is given (the crank journal or the crank pin journal, of course, being placed on its dead centre). The eccentric being secured, the crank is placed on the other dead centre, and the lead measured; and if it is equal at each part, the eccentric is set and the rods are of the correct length. If there is more lead at one end than the other, the eccentric rod is of improper length, and must be altered to half the amount of the difference in the lead; then the above process must be repeated, in order to set the eccentric in its proper position. If the eccentric is secured by a feather, as in English practice, the next job is to set the feather into the axle, and as there are four feathers, it is considered that it pays to take the wheels out of the engine, on account of the awkwardness of working under the engine. This causes much trouble and loss of time, making it an object to set the eccentrics on the shaft before putting the wheels on at all, and a method of doing this is given in the following illustrations.



LOCOMOTIVE PRESSURE-GAUGE MIRROR.

In fig. 1, *G* is a gauge of sheet iron about $\frac{1}{16}$ in. thick. Its edge *A* is at an angle equal to the angular advance of the eccentric; at *B* it fits to the body of the axle. The edge *C* stands vertical when the eccentric is properly set, and at *D* is a notch used to find the throw-line of the eccentric. The method of marking out such a gauge is shown in fig. 2, in which *X* represents the centre line of the crank throw, and *Y* the journal, the circle *B* representing the shaft. A line *L* is drawn parallel to *X*, and a vertical line *K* is drawn, passing through the centre of the axle. To the right of this and distant from the line *K* to an amount equal to the amount of loss on the valve plus the required amount of valve lead a line *M* is drawn, being parallel to *K*. From the centre of the axle a circle *V* is drawn, passing through the centre *W* of the eccentric (its radius obviously equaling the eccentric throw). A line drawn through *W* and the axle centre will then represent the throw line of the eccentric when set in its correct position, the angular advance being angle *P*. The edge *C* of the gauge is at a right angle to *X*, and therefore stands vertical when *X* is horizontal.

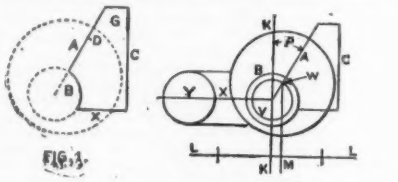


FIG. 1.

FIG. 2.

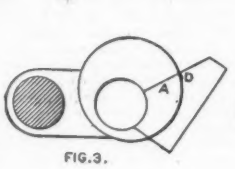


FIG. 3.

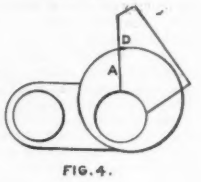


FIG. 4.

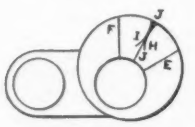


FIG. 5.

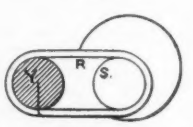


FIG. 6.

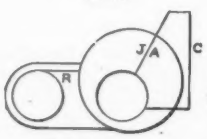


FIG. 7.

FIG. 8.

The actual process of using the gauge is as follows: First the throw line of the eccentric must be found, and to do this the gauge is applied as in fig. 3, the notch at *D* coming fair with the circumference of the eccentric. A line is then drawn on the eccentric face, using edge *A* of the gauge as a straight-edge. The gauge is then moved on to the position shown in fig. 4, the notch *D* again being fair with the outside edge of the eccentric, and another line is drawn coincident with the edge *A* of the gauge and upon the face of the eccentric.

These two lines are shown at *E* and *F* in fig. 5, and from their outer extremities arcs *H* and *I* are drawn with compasses. The gauge is then used to mark the line *J* meeting the two arcs, and *J* is the throw line of the eccentric. The next operation is to set the throw line of the axle level, which is done by marking on the axle throw a circle *S*, fig. 6, equal in diameter to the throw journal *Y*, and marking a line *R* to touch the journal and the circle *S*. A spirit level applied to this line sets the throw line horizontal. The gauge is then applied as in fig. 7, the eccentric being set so that its throw line is fair with edge *A* of the gauge when its edge *C* is vertical, a spirit level being used to test it. For the other eccentric the gauge is merely turned upside down, as in fig. 8, and the above process repeated. I have given the process just as I saw it practiced in an English workshop for an English locomotive having no rock-shaft. All that requires to be done when the engine has a rock-shaft is to mark the line *M*, fig. 2, on the left of line *K*, thus throwing the line *A* on the left hand of *K* and shaping the template accordingly. In the case of the small shops on branch roads, this system is very advantageous, but it is not to be overlooked that, like some other methods, it is not absolutely correct, since it does not take into account the variation of valve movement caused by the angularity of the eccentric rod. This, however, is of no practical importance, except in the case of very short eccentric rods.

In another shop here I saw an error committed that I have seen made in the United States, and that is given in many of the articles upon how to set a slide valve. It consists of "squaring the valve," or, in other words, of altering the length of the eccentric rod until it moves the valve an equal distance past each steam port. This is all right enough if the valve is to be left with the unequal lead that this method gives, but it is almost the universal practice to have the lead equal for both ports, and in this case squaring the valve is merely a process of first making the eccentric rod the wrong length and then altering it back again to equalize the lead.

LONDON, ENGLAND. JOSHUA ROSE, M. E.

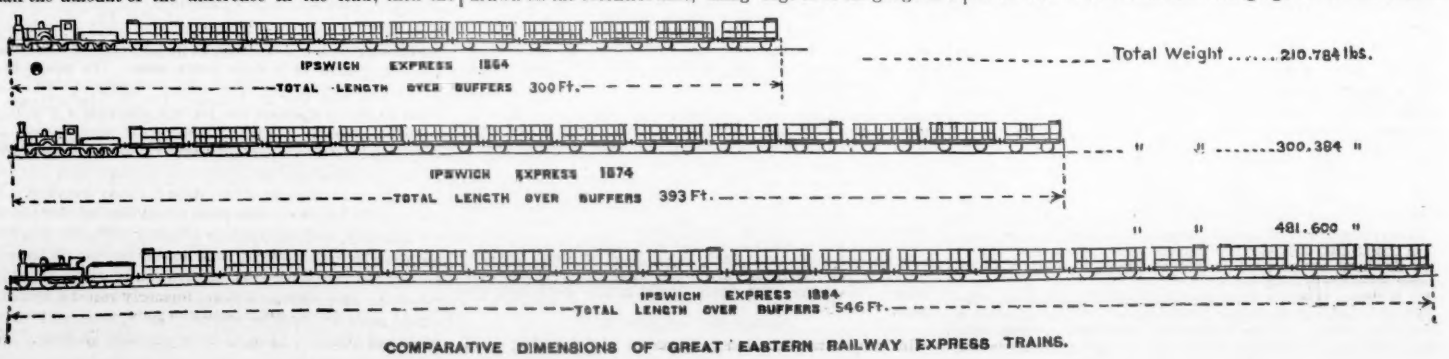
Locomotive Pressure-Gauge Mirror.

A very neat little device is employed on the engines of the London & Northwestern Railway (England) for illuminating the dials of the brake and steam pressure gauges. An ordinary oil lamp is used to throw a light on the glass water guage, but as a lamp higher up in the cab is apt to hinder the look-out at night, a couple of small mirrors about 2½ in. square are fixed at the proper angle to the inside of the roof, of the cab. The light from the fire is thus reflected on the dials of the gauges, and illuminates them in a very satisfactory manner. The mirrors are held in a small piece of sheet iron, which is secured to the roof of the cab. The mirrors are in the centre of the roof, and are therefore above the men's heads and not likely to be struck in firing. The sheet iron yields, however, to any accidental blow received while cleaning the fire, etc., and can be easily bent back again into the proper position.

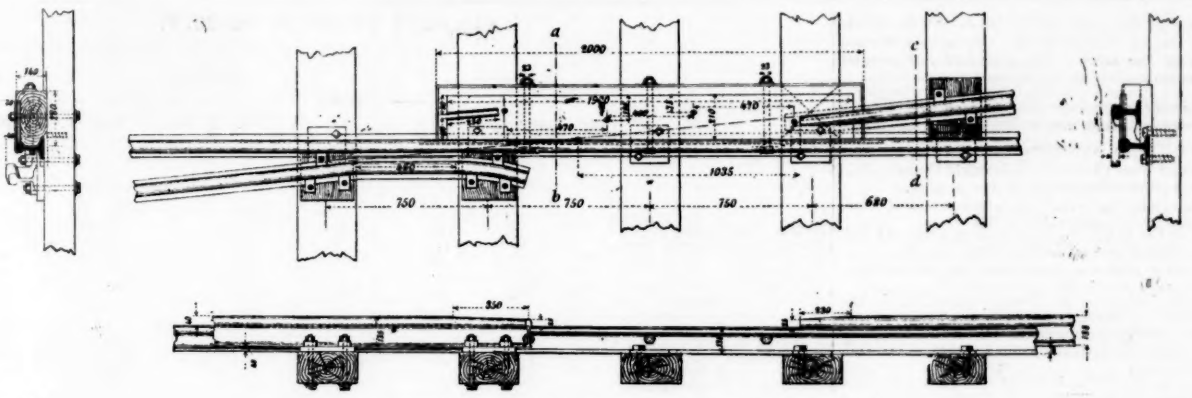
The accompanying diagram explains the application of the mirrors, which are the invention of Mr. Brown, an engineman on the line.

Comparative Dimensions of Great Eastern Railway Express Trains.

The accompanying diagram was presented in *The Engineer* in connection with some interesting figures of the fuel con-


IPSWICH EXPRESS 1864
TOTAL LENGTH OVER BUFFERS 300 Ft.
Total Weight ..... 210.784 lbs.
IPSWICH EXPRESS 1874
TOTAL LENGTH OVER BUFFERS 393 Ft.
" " ..... 300.384 "
IPSWICH EXPRESS 1884
TOTAL LENGTH OVER BUFFERS 546 Ft.
" " 481.600 "

COMPARATIVE DIMENSIONS OF GREAT EASTERN RAILWAY EXPRESS TRAINS.



GERMAN FROG FOR FACTORY SIDINGS.

sumption of English locomotives, showing a very remarkable progress in the average weight of one train at least in England. The diagram is to scale and shows that the train has increased as follows :

	1864.	1874.	1884.	—P. c. of inc.— 1864-74.	1874-84.
In weight, tons.....	105.4	150.2	240.8	42.5	60 2
In length, ft.....	300	393	546	31	39
In No. of coaches.....	10	13	16	30	23

The cubic contents per passenger, it is plain from the diagram, would show quite as remarkable an increase after allowing for the greater number of passengers, and indicates quite as marked an advance in the accommodation offered to passengers as has taken place in this country in the same time ; although the conclusion which might be over-hastily drawn from the diagram, that it indicated the average growth in the dimensions of all trains, would probably not be a correct one.

A series of diagrams illustrating in the same way the average length and load of American freight trains, would show even a more striking development in the same time, and would constitute an impressive object lesson in the art by which freight expenses have been brought down to half a cent per ton per mile and less.

German Frog for Factory Sidings.

We publish herewith an illustration of a German effort to dispense with that admittedly great evil in first-class track, a frog. We find the one here illustrated in the *Organ fur die Fortschritte des Eisenbahnwesens.* It is used in connection with a switch very similar to the Wharton in principle; and while the device would seem to be much cheaper than any ordinary frog, it has the far greater merit of leaving the main track absolutely unbroken.

The lower edge of the rail in the plan (upper) view above is the gauge side of the main rail. On the outside of the main rail, it will be seen, there is placed a plank faced with iron, with the top flush with the top of the rail. Over this surface and over the top of the main rail the wheel rides on its flange, the tread, however, being supported by the wing-rail until the flange has passed nearly over the main rail.

Unless, therefore, the inside wing-rail wears down faster than the main rail, the latter is measurably protected from serious grooving, although if the siding were much used, more or less injury to the main rail would almost certainly result. It is not designed for sidings which are much used, however, but only for those where occasional cars only are shoved in and out, and over which a locomotive rarely if ever passes.

Two other devices for the same purpose, which we hope to describe fully hereafter, are more elaborate than this German arrangement. They contemplate, and actually effect, but by quite different details, the placing of a movable support for the tread of the wheel at such height above the main rail as shall enable the flange to just clear it when a train is entering the siding, and are accompanied by safety devices by which the safe passage of trains on the main track is assured at all times should the switch by accident be left wrong, in position for trains to take the side-track. Both of them are the invention of practical railroad men, viz : Mr. C. B. Price, Superintendent of the River Division of the Allegheny Valley Railroad, and Mr. W. W. Mansfield, Engineer of Maintenance of Way of the Chicago, St. Louis & Pittsburgh Railroad. Both of them have been in practical use for some time, and, it is said, with very successful results. They are, however, more complicated than the one illustrated, which would seem capable of useful service at certain little used and short sidings. This much can at least be said for all such efforts, that it is a hopeful and evident direction for possible improvement, and probably hundreds of railroad men have at one time or another given the matter more or less thought. Sufficient success would seem to have been already attained to merit more extended and thorough practical test, for a greater improvement in the minor details of permanent way could hardly be made than to dispense with a large proportion of the frogs.

Steel Castings.

Mr. Jeremiah Head spoke as follows of steel castings in his presidential address to the Institution of Mechanical Engineers (England) :

Steel castings began to come into extensive use about 23 years since. They were then made of crucible steel only, and no great size or weight was attempted. An urgent need had long existed for a material which could be cast in a mold, and which should yet have the toughness and tenacity of wrought iron. Portions of machinery that are subjected to severe strain, such, for instance, as the pinions and clutches of reversing rolling mills and the propelling gearing of steam plow engines, are cases in point. No increase of substance would give the requisite strength so long as the material remained cast-iron ; inasmuch as the destructive force depending on the inertia of the parts would increase proportionately. But the difficulty was entirely obviated by the use of steel castings ; for the strength and toughness in that case are largely increased without increasing the inertia. Before the time named, articles of enormous weight, such as screw propellers, were occasionally made even of cast brass or gun-metal, at a twelve-fold expense compared with cast iron, in the hope of obtaining a slight increase of tenacity and some little ductility. The modern alloys of manganese and phosphor-bronze, and Dick's metal, which in some forms are claimed to be as strong and tough as wrought-iron, were then unknown; and therefore the need of a better material for castings was more urgent than it would otherwise have been.

As to those respects in which iron castings have the advantage: 1. Steel castings seldom, if ever, have the fine surface, sharp edges and pleasing appearance of good iron ones. This arises no doubt from the higher temperature of the molten metal in the former case, and its destructive action on the surfaces of the mold. Annealing also usually detracts considerably from the appearance. 2. Both on the surface and internally steel castings are much more liable to cavities and blow-holes. 3. If not fully and equally annealed throughout, steel castings are quite unreliable and even treacherous. 4. The delay in obtaining steel castings, owing to the time required for annealing, is so considerable as often, in pressing cases, to compel the reluctant substitution of iron ones. Besides the points just raised, there are many others which seem to force us to the conclusion that the art of iron founding is in no danger of extinction, or even of serious diminution. In a majority of cases where cast-iron has hitherto been used, mass, and the stiffness due thereto, are required, rather than great tenacity or ductility. For columns, water and gas mains, engine frames, cylinders, condensers, bed-plates, lathe beds, machine frames, bridge cylinders, railway chairs, household grates, roofing gutters, rain pipes, certain culinary utensils, cellar gratings, and for very many other purposes, steel would not answer better, if indeed so well as iron, even though there were no difference in price.

Again, for wearing surfaces, such as the motion blocks and bars of a steam engine, nothing works better than cast iron upon cast iron, if only the areas be sufficient; and this property is still more remarkable in the case of pistons in cylinders and slides on slide faces, working as they often do for long periods, and remaining in excellent condition, with no other lubrication than the steam itself. There is not, so far as I am aware, any evidence to show that steel castings would answer at all in such positions. There are indeed purposes for which the one material is fittest, and others for which the other is fittest. Time will show; but meanwhile nothing like the wholesale superseding of cast iron by steel is in the least probable.

The cost of steel castings has been greatly cheapened latterly by the employment of the Bessemer and open-hearth processes. But the expectation which is occasionally expressed, that steel castings are about to supersede iron ones altogether, does not seem at all likely to be realized. For, in the first place, steel castings are from three to five times dearer than iron ones; and in the second place, while their general superiority is beyond question, iron castings have still the advantage in certain respects.

Steel castings are dearer than iron : 1. Because the value of molten steel is considerably greater than that of molten cast iron. 2. Because, in order to get sound castings, there must be very much more waste in "dead-heads" with steel than with iron ; these are difficult and costly to remove, and entail a loss represented by the difference between steel casting value and pig-iron, which is greater than that between iron casting value and pig-iron. 3. Because the annealing process, without which steel castings are useless, is tedious and expensive. 4. Because the higher melting point of steel compared with iron necessitates more costly molds. In consequence of these peculiarities the quantity of finished steel castings capable of being turned out in a given space, with a given number of hands and a given value of plant, is small compared with a corresponding output in iron castings. And as these impediments are mostly of a permanent character, the relative value of steel castings is not likely to be greatly altered in the near future.

Massachusetts Railroad Semi-Centennials.

From an article in the *Congregationalist*, by Mr. W. A. Crafts, Secretary of the Massachusetts Railroad Commission, we copy as follows :

It is 50 years this summer since the three pioneer railroads of Massachusetts, the Boston & Lowell, the Boston & Worcester and the Boston & Providence, were opened for travel their entire length. They had been constructed under great difficulties, when capital was not abundant, by the persevering efforts of a few enterprising men in a new and untried field, and their completion was the opening of a new era in the progress of the state When these roads were projected in 1829-30, it was supposed that they would be used with horses for motive power, and that any one could use them with his own properly constructed car, paying toll according to the distance traveled, as in the case of canals. But before the construction of the roads was actually begun, the success of locomotive engines had been thoroughly established in England, and the original plan was abandoned for the improved method of locomotion. In other parts of this country experiments, more or less successful, had been made with crudely-constructed locomotive engines, but Stephenson's engines in England did much more to determine the future method of traveling. The first locomotives used in Massachusetts were imported; others were immediately built here after the same pattern, and Yankee ingenuity soon constructed others of various and distinct kinds.

The building of these three railroads had been watched with a lively interest, and there was a general desire to witness the new method of traveling, of the success of which in England so much had been said. The writer remembers seeing, when a boy, the trial trip on the Boston & Worcester Railroad, of its first locomotive, built by Robert Stephenson, in Newcastle, England. It was Fast-day morning, and, seen from a distance as it went over the Back Bay, leaving a long trail of smoke and steam behind, it seemed to our inexperienced eyes almost to fly. Fast-day 50 years ago was not the secular holiday which it has since become, and the limited population of Boston furnished a small number of idlers and pleasure-seekers compared with those of the present day. But in the afternoon large numbers of people, including staid attendants at the morning church services, went to take a look at the new wonder, and were astonished to see it haul, with apparent ease and remarkable speed, 10 or 12 loaded dump-cars. This locomotive was mounted on four wheels and weighed about eight tons. By the side of the powerful engines of the present day, weighing 40, 50 or 60 tons, it would appear as a mere toy. But locomotive construction was then in its infancy, and even six years later the directors of the Boston & Worcester road had grave doubts as to the expediency of adopting engines weighing 11 or 12 tons.

In the summer of 1834 the Boston & Worcester Railroad was opened for travel as far as Newton, and subsequently to Westboro, and the Boston & Providence as far as Readville, and they each carried many passengers, who went chiefly for the novelty of the ride. But while large numbers were desirous of trying this new mode of traveling, there were not a few—and they were not all old women—who were too timid to trust themselves to the new-fangled kind of stage-coach, with rapid motion.

To the younger generation of the present time, those cars, as well as the engine, would be veritable curiosities. Many of them were like three ordinary stage-coach bodies joined together, each forming a separate compartment; while others were similar to, and not much larger than, our present street cars, but without platforms and with doors at the side. They were on smaller wheels than are now used, and were barely high enough for a man to stand erect in them. The brakeman sat upon the top like the driver of a coach, and the couplings allowed so much play that his back must have been sometimes sorely strained by the sudden start of his car.

In the summer of 1835, as before stated, at different dates, the three pioneer railroads were opened to their farther termini. Great was the rejoicing of the inhabitants along the respective lines, and hearty the celebrations of those events, which opened a new era for traveling and for the business interests of the state. The people left their occupations and crowded about the stations to see the powerful iron horse, with its long train of cars filled with passengers; and if the remarks, wise and otherwise, of the curious or skeptical spectators could have been collected, they would form now a mirth-provoking volume.

On a single track, and with an equipment such as above described, the regular operation of these roads commenced. At first the trains were usually two each way, and ran with commendable regularity, barring an occasional failure of an engine by breakage, or lack of wood or water. How remarkable this regularity was considered may be inferred by a statement in the report of the Boston & Worcester directors to the Legislature in the spring of 1836, that there were "only six days during the winter in which one or more passages have not been made, and not more than 20 days in which the whole number of passages (two each way) have not been made at the stated hours and in the regular period."

TECHNICAL.

Locomotive Building.

The Baldwin Locomotive Works in Philadelphia have taken an order for 12 freight engines for the Missouri Pacific road.

The contract for the locomotives for the new Chicago, Burlington & Northern road has been awarded to the Rhode Island Locomotive Works in Providence. The order includes 35 locomotives for passenger, freight and switching service, and the delivery is to begin Jan. 1 next.

The Car Shops.

The Litchfield Car Co., in Litchfield, Ill., have taken contracts to build 200 box, 100 stock and 100 flat-cars for the Missouri, Iowa & Nebraska road.

The Pullman Car Shops at Pullman, Ill., have secured the large contract for cars for the new Chicago, Burlington & Northern road. The contract includes 35 passenger cars and 1,500 freight cars of various classes. The prices at which this contract was taken have not been made public.

The Wason Car & Foundry Co. in Chattanooga, Tenn., have taken a contract for 100 freight cars for a Louisiana road.

The Portland Co., in Portland, Me., is building 50 flat-cars for the Maine Central road.

Some of the men who were thrown out of work by the shut-down at the Anniston Car Works, in Anniston, Ala., which are in the hands of a receiver, are operating them again in a small way. The Receiver gives them the use of the plant pending a disposal of the property that will give them work again.

Bridge Notes.

The Atlanta Bridge Works, formerly run by Wilkins, Post & Co., are to be reorganized as a joint stock company. Under the plan adopted the creditors will take stock to the amount of their claims, and the new company will issue $300,000 in bonds, secured by mortgage upon the property, which bonds

will be used to pay off the preferred creditors. All the bonds have been taken and all the creditors have agreed to take their proportion of the stock. The company has secured several contracts and the works will be started up shortly.

R. W. Boland, who owns a machine shop in Birmingham, Ala., has commenced the manufacture of iron bridges and has taken a contract for a highway bridge near Birmingham.

Iron and Steel.

Jefferson Furnace at Port Clinton in Schuylkill County, Pa., has gone into blast after a suspension of over a year.

Norway Furnace in Berks County, Pa., has gone into blast after being thoroughly overhauled and repaired.

The Thomas Iron Co. is making extensive repairs and improvements on its blast furnaces at Hokendauqua, Pa.

The Union Rolling Mill Co. is running its mill in Cleveland, O., steadily, with about 350 men employed.

The Poughkeepsie Iron Co. in Poughkeepsie, N. Y., has had either one or both of its furnaces in blast for 33 years past, with the exception of three months when the company was compelled to blow out both stacks on account of the failure of the supply of coal.

The Troy Iron & Steel Co. in Troy, N. Y., has closed a contract with James P. Witherow, of Pittsburgh, to build three blast furnaces. The furnaces will be 80 by 18 ft. and will be supplied with all the latest improvements. The contract includes 7 blowing engines with 42-in. cylinders and 84-in. blast cylinders with a 60-in. stroke. There will be 36 boilers, each 46-in. diameter and 34 ft. long. The furnaces will make Bessemer iron from a mixture of Lake Champlain and Hudson River ore.

The Andover Iron Co. at Phillipsburg, N. J., has let contracts for the iron works for a new blast furnace.

Manufacturing and Business.

The fame of the hoisting machinery built by the Scaife Foundry & Machine Co. for the Penn Inclined Plane Railway, which was completed about a year ago, has reached to Southern Russia. A similar incline is being put at Kiew, on the River Dnieper, and the above named company have been requested to prepare and forward bids for the hoisting machinery for it.—*Pittsburgh American Manufacturer.*

The Consolidated Safety Valve Co. has bought ground in Bridgeport Conn., on which to erect new works. The company's present works are in Boston.

The Curlin Switch & Crossing Co. has been organized in Louisville, Ky., with $100,000 capital stock, to manufacture railroad frogs, crossings and switches.

The Armington & Sims Engine Co. in Providence, R. I., is running its shops extra time, having orders ahead for over 50 engines of various sizes.

The Curtis Regulator Co., of Boston, has recently supplied the Water Works Co., of Helena, Montana, with nine large pressure regulators for their street mains. The office of these regulators is to reduce the water pressure from 160 to 80 lbs. in the mains, thereby taking off the excessive pressure from the service pipes which is so injurious to fixtures and hose.

The Rail Market.

Steel Rails.—The market is quiet, with a number of sales of small lots reported. At present the makers are maintaining quotations uniformly at $29 per ton at mill, and this price, it is understood, they have agreed to maintain until the close of the present year. It is also reported that at the recent meeting it was resolved to make $30 the minimum price for next year.

Rail Fastenings.—Nominal quotations remain unchanged at 1.60 cents per lb. for spikes in Pittsburgh; 2.40@2.80 for track-bolts and 1.60@1.70 for splice-bars. More inquiry is reported, with a prospect of better business than there has been for some time past.

Old Rails.—There is some inquiry for old iron rails, and the stock on hand at present is light. Quotations vary from $16.50@$17.50 per ton at tidewater. A better demand for old steel rails is also reported, and they are quoted at $17@$18 per ton in Pittsburgh.

An Old Boiler.

A steam boiler was taken out from one of our city workshops lately which had seen service in the late war. It was one of a battery on a gunboat that left St. Louis on its first trip to help capture Fort Donelson. The mate of this boiler was pierced by a shell from the fort, when the boat fell out of action and was taken back to the city whence it had come, and was there wrecked. This boiler was brought here and was used until lately.—*Pittsburgh American Manufacturer.*

Street Car Springs.

Messrs. Andrews & Clooney, of New York, are manufacturing a new combination rubber and steel, street-car spring, the design of which is to carry the car as well when empty as when loaded, and equally well under varying loads. It has been thoroughly tested in practical use, and is now furnished in sizes and forms adapted to all forms of boxes and sizes of cars.

A Handsome Private Car.

The Jackson & Sharp Co. is just completing an elegant private car for Austin Corbin, the New York banker, President of the Long Island Railroad, the Manhattan Beach and Marine Railway, as well as the Indiana, Bloomington & Western. The exterior of the car is painted a Munich lake color, similar to a maroon, and is richly ornamented in gold. The name "Long Island" is emblazoned on the letter boards, and the name of the car, "Manhattan," on the centre of either side. At the ends are the combined Miller and Janney platforms of more than the ordinary size, with extensions over the steps and inclosed by railing and gates with silver-plated hand rails. It has both the Smith vacuum and the Westinghouse automatic brakes.

The body is mounted on 6-wheel trucks, with 33-in. Page wrought metal wheels, with steel tires and French & Co.'s triple elliptic springs. Beneath the body is a W. C. Baker's patent self-feeding heater, made by the Standard Car Heating & Ventilating Co. of Pittsburg, which can be coaled from either side from galvanized iron coal boxes. Four large lockers also occupy places beneath the car for the carrying of tools, provisions, ice and meats. They are accessible from the interior of the car by means of a trap-door concealed in a closet.

The interior is unique, luxurious. Finest Mexican mahogany is used, and the bulkheads, with panels of different sizes, are highly polished by hand. All the apartments are so finished except the kitchen and smoking-room, which are finished in antique style in quartered oak. All the clear glass is French plate, and all the mirrors are French beveled plate. The upper sash of every window is filled with different styles of leaded glass in rich colors. The ornamental glass used in the deck lights, for the upper and lower borders of the windows, and the entire windows of the dressing rooms and kitchen, is of fine stained glass in leaded frames, which give a fine effect. Old brass is used in all the metal trimmings except the wash rooms, where they are silver-plated. The chandeliers have from two to four lights each, and they, as well as the side lights, are supplied with fine cut glass globes.

The floors are covered by fine Wilton carpets. The windows have India silk curtains running on brass rods. A novel covering is used for the the ceilings. Instead of the

RAILROAD EARNINGS IN JULY.

NAME OF ROAD.	MILEAGE. 1885.	1884.	Inc.	Dec.	P. c.	EARNINGS. 1885.	1884.	Inc.	Dec.	P. c.	EARNINGS PER MILE. 1885.	1884.	Inc	Dec.	P.c.
EASTERN ROADS.															
Baltimore & Potomac	92	92				$ 103,805	$ 106,918	$	$ 3,113	2.9	$ 1,128	$ 1,162	$	$ 34	2.9
Boston, Hoosac Tun. & West.	87	87				41,468	43,012		1,544	3.6	477	494		17	3.6
Grand Trunk	2,918	2,918				1,408,177	1,625,156		216,979	13.4	483	557		74	13.4
Long Island	354	354				373,081	366,852	6,229		1.7	1,054	1,036	18		1.7
N. Y. Lake Erie & West	1,075	1,075				1,308,180	1,458,186		150,006	10.3	1,217	1,356		139	10.3
N. Y. & New England	400	400				296,112	276,217	19,895		7.2	740	691	49		7.2
N. Y., Ontario & Western	373	373				194,643	195,176		533	0.3	522	524		2	0.3
N. Y., Sus. & Western	147	147				100,696	97,017	3,679		3.8	685	660	25		3.8
Northern Central	322	322				411,722	477,516		65,794	13.8	1,279	1,483		204	13.8
Pennsylvania	2,270	2,125	145		6.9	3,085,105	3,980,085		303,980	7.6	1,623	1,877		254	13.6
Philadelphia & Reading	1,560	1,560				2,641,851	2,767,791		125,940	4.5	1,693	1,774		81	4.5
Rochester & Pittsburgh	294	294				110,895	109,945	950		0.9	377	374	3		0.9
West Jersey	201	188	13		6.9	169,505	178 532		9,027	5.0	843	950		107	11.4
Total, 13 roads	10,093	9,935	158			10,845,240	11,691,403	30,753	876,916		1,074	1,177		103	
Total inc. or dec			158		1.6				846,163	7.1				103	8.8
SOUTHERN ROADS.															
Alabama Great Southern	290	290				70,092	73,900		3,808	5.1	242	255		13	5.1
Cin., N. O. & Tex. Pacific	336	336				222,929	226,702		3,773	1.7	664	675		11	1.7
East. Tenn., Va. & Ga	1,100	1,100				298,824	278,037	20,787		7.5	272	253	19		7.5
Florida Ry. & Nav. Co	540	500	40		8.0	66,646	60,861	5,779		9.5	124	122	2		1.5
Ill. Cen., Southern Div	711	578	133		23.0	222,005	240,049		18,044	7.5	312	415		103	25.0
Louisville & Nash	2,015	2,065		50	2.4	1,057,332	1,060,104		2,772	0 3	525	513	12		2.4
Mobile & Ohio	528	528				118,293	129,323		11,030	8.5	224	245		21	8.5
Memphis & Charleston	292	292				83,816	105,471		21,655	20.5	287	361		74	20.5
Nashville, Chatta. & St. L	574	554	20		2.6	165,667	187.475		21,808	11.7	289	338		49	14.4
N. Orleans & Northeastern	195	195				33,504	25,510	7,994		31.4	172	131	41		31 4
Norfolk & Western	512	503	9		1.8	210,267	185,824	24,443		13.0	411	369	42		13.0
Rich. & Danville	757	757				272,277	250,923	21,354		8.5	360	331	29		8.5
Char., Col. & Augusta	370	370				47,982	40,879	5,103		12.4	124	110	14		12.4
Col. & Greenville	296	296				31,682	30,880	802		2.6	107	104	3		2.6
Georgia Pacific	318	288	30		10.4	43,233	46,650	2,583		6.3	136	141		5	3.6
Virginia Midland	352	352				130,570	131,305		735	0.5	370	373		3	0.5
Western N. Carolina	274	208	66		31.8	88,883	85,719	3,114		3.6	142	172		30	17.6
South Carolina	247	247				61,137	59,255	1,882		3.2	248	240	8		3 2
Vicksburg & Meridian	142	142				29,574	32,174		2,600	8.1	208	227		19	8.1
Total, 19 roads	9,849	9,601	298	50		3,202,657	3,195,041	93,841	86,225		325	333		8	
Total inc. or dec			248		2.6			7,616		0.2				8	2.4
CENTRAL GROUP.															
Chi. & Eastern Illinois	252	252				112,707	128,394		15,687	12.2	448	510		62	12.2
Chi. & West Michigan	413	413				112,719	123,883		11,164	9.0	272	300		28	9.0
Cin., Ind., St. L. & Chicago	342	342				170,922	209,515		38,593	18.4	500	613		113	18.4
Cin., Wash. & Baltimore	284	284				117,241	141,733		24,492	17.3	413	499		86	17.3
Cleve., Akron & Columbus	144	144				44,251	41,213	3,038		7.5	307	286	21		7.5
Detroit, Lansing & No	258	258				93,592	97,903		4,311	4.4	363	379		16	4.4
Evansville & Terre Haute	146	146				66,066	73,422		7,256	10 0	453	505		52	10.0
Flint & Pere Marquette	362	362				151,470	172,853		21,383	12.3	418	477		59	12.3
Illinois Central, Ill. lines	953	953				496 486	464,185	32,301		7.0	521	487	34		7.0
Ind., Bloom. & West	532	532				167.665	173,188		5,523	3.2	315	325		10	3.2
Lake Erie & Western*	380	386				74,781	76,356		1,575	2.0	194	198		4	2.0
N. Y., Pa. & Ohio	570	570				372,856	480,077		107,221	22.3	654	842		188	22.3
Ohio & Mississippi	615	615				283,220	282,202	1,018		0.4	461	459	2		0.4
Ohio Southern	130	130				26,054	35,356		10.302	29.4	193	272		79	29.4
Peoria, Decatur & Ev	254	254				52,531	54,783		2,252	4.1	207	216		9	4.1
St. L., Alton & Terre Haute:															
Main Line	195	195				81,152	90,095		8,943	9.9	416	462		46	9.1
Belleville Line	138	138				52.288	44,596	7,692		17.1	379	323	56		17.3
Wabash, St. L. & Pacific	2,572	3,546		974	27.4	932,678	1,234,298		301,620	24.4	363	348	15		4.9
Total, 18 roads	8,546	9,520		974		3,407,679	3,924,052	44,049	560,422		399	412		13	
Total inc. or dec				974	10.2				516,373	13.2				13	3.1
NORTHWESTERN ROADS.															
Bur., Cedar Rap. & No	990	714	276		39.0	224,381	195,970	28,411		14.5	227	276		49	17.6
Central Iowa	500	500				85,965	96,322		10,357	10 8	172	193		21	10.8
Chi. & Alton	850	850				666,584	730,944		70,360	9.6	777	860		83	9.6
Chi., Bur. & Quincy	3,490	3,373	117		3.5	1,812,834	1,735 199	77,635		4.5	519	514	5		0.9
Chi., Mil. & St. Paul	4,804	4,760	44		0.9	1,894,000	1,949.545		55,545	2.8	394	410		16	3.8
Chi. & Northwestern	3,843	3,763	80		2.1	2,074,000	1,976 177	97,823		5.0	540	525	15		2.9
Chi., St. P., Minn. & Omaha	1,320	1,300	20		1.7	468,800	466,760	2,040		0.4	355	359		4	1.1
Des Moines & Ft. Dodge	138	138				29,324	23,680	5,644		23.8	212	172	40		23.8
Ill. Central, Iowa lines	402	402				128,799	127,718	1,081		0.8	320	318	2		0.7
Marquette, H. & Ont	100	138	23		15 7	124.599	140,635		16,034	11.4	779	1,019		240	23 6
Mil., Lake Shore & West	512	374	138		37.2	112,818	96,898	15,920		16.4	220	259		39	15.0
Mil. & Northern	227	227				45.022	42,050	2,972		6.1	198	185	13		6.1
Minneapolis & St. L	575	435	140		32.2	146,059	155,483		9,424	6.1	254	257		103	28.6
Wisconsin Central	440	440				114,567	107,794	6,771		6.3	260	245	15		6.3
Total, 14 roads	18,251	17,414	837			7,921,750	7,845,173	238,297	161,720		434	451		17	
Total inc. or dec			837		4.7			76,577		0.9				17	3.4
ROADS NORTHWEST OF ST. PAUL.															
Canadian Pacific	2,794	2,408	386		16.1	907,638	549 367	358,271		65.2	325	228	97		42.2
Northern Pacific	2,648	2,453	195		8.0	1,000,011	1,022,438		22,427	2.2	378	417		39	9.3
St. P. & Duluth	227	227				141,855	119.500	22,355		18 6	625	526	99		18.6
St. P., Minn. & Manitoba	1,476	1,397	79		5.7	553,347	605,156		51,809	8.6	375	433		58	13.5
Total, 4 roads	7,145	6,485	660			2,602,851	2,296,461	380,626	74,236		364	354	10		
Total inc. or dec			660		10.2			306,390		13.4			10		3.0
SOUTHWESTERN ROADS.															
Fort Worth & Denver	144	110	34		30.9	49,067	50,359		1,292	2.5	341	458		117	25.4
Gulf, Colorado & Santa Fe	536	536				135,421	126,432	8,989		7.1	253	236	17		7.1
Kan. City, Ft. Scott & Gulf	389	389				185,943	176,240	9,703		5.5	478	453	25		5.5
Kan. City, Sp'f'd & Memp	282	282				99.352	92,872	6,480		7.0	352	329	23		7.0
Little Rock & Ft. Smith	168	168				36,392	32,820	3,572		10.9	217	195	22		10 9
L. R., Miss. River & Texas	170	170				19,849	24,190		4,341	18.1	116	142		26	18.1
St. L., Ft. Scott & Wichita	215	160	55		34.4	48,740	42,309	6,431		15.3	227	264		37	14.2
St. L. & San Francisco	804	775	29		3.7	325,114	359,111		33,997	9 4	404	463		59	12.8
Texas & St. Louis	735	735				87,708	79.761	7,947		10.0	119	108	11		10.0
Vicks., Shreveport & Pac	170	124	46		37.1	25,194	14,360	10,834		77.6	148	87	61		77.6
Total, 10 roads	3,613	3,449	164			1,012,780	998,454	53,956	39,630		280	289		9	
Total inc. or dec			164		4.8			14,326		1.4				9	3.1
FAR WESTERN AND PACIFIC ROADS.															
Atchison, Top. & Santa Fe	2,375	2,377		2	0.1	1,181,783	1,301,637		119,854	9.2	498	548		50	9.1
Denver & Rio Grande	1,317	1,317				548,295	460.400	147.895		36.9	415	304	111		36.9
Denver & R. G. Western	368	368				86,175	45.712	40.463		88.0	234	124	110		88.0
St Joseph & Grand Island*	252	252				61,246	69,326		8,080	11.7	243	275		32	11.7
Union Pacific	4,476	4,256	220		5.1	2,304,990	2,375,899		70,909	3.0	515	558		43	8.0
Total, 5 roads	8,788	8,570	220	2		4,182,489	4,192,974	188,358	198,843		476	489		13	
Total inc. or dec			218		2.5				10,485	0.2				13	2.7
GRAND TOTAL:															
Total, 83 roads	66,285	64,974	2,337	1,026		33,175,446	34,143,558	1,020,880	1,997,992		500	525		25	
Total inc. or dec			1,311		2.0				968,112	2.8				25	4.8

*Not in the table for the seven months.

RAILROAD EARNINGS, SEVEN MONTHS TO JULY 31.

NAME OF ROAD.	MILEAGE.					EARNINGS.					EARNINGS PER MILE.				
	1885.	1884.	Inc.	Dec.	P. c.	1885.	1884.	Inc.	Dec.	P. c.	1885.	1884.	Inc.	Dec.	P.c.
EASTERN ROADS.															
Balt. & Potomac	92	92	....	....	....	$ 759,347	684.779	$ 74,568	$	10.9	$ 8,254	$ 7,443	$ 811	$	10.9
Bos., Hoos. T. & W.	87	87	...	....	....	251,190	240,321	10,869	.....	4.5	2,887	2,762	125	.....	4.5
Grand Trunk	2,918	2,918	....	....	....	8,544,735	9,612,544	.....	1,077,809	11.1	2,925	3,294	....	369	11.1
Long Island.....	354	354	....	....	....	1,542.520	1,501,828	40,692	.....	2.7	4.357	4,242	115	.....	2.7
N. Y.,Lake E & W.	1,075	1,075	....	....	....	8,402.334	9,129.246	.....	726,912	7 9	7,816	8,492	....	676	7.9
N. Y. & New Eng..	400	400	...	....	....	1,810,057	1,864.076	.....	54,019	2.9	4.525	4 660	....	135	2.9
N. Y., Ontario & W.	373	373	...	....	....	1,015,000	1,040,699	.....	25,699	2.5	2,721	2,790	....	69	2 5
N. Y., Susq. & W..	147	147	....	....	....	596,811	548.945	47,866	.....	8.7	4,060	3,734	326	.....	8.7
Northern Central..	322	322	....	....	....	3,009.494	3,097,771	.....	88.277	2 9	9,346	9 620	....	274	2.9
Pennsylvania.....	2,268	2,112	156	....	7.4	25,004,701	27.322,337	.....	2.317,636	8.5	11.025	12,937	....	1,912	14 8
Phila. & Reading..	1,560	1,560	...	....	....	15,352,053	16 986,454	.....	1,634,401	9.6	9,841	10,889	....	1,048	9.6
Rochester & Pitts.	294	294	....	....	....	662,960	609.235	53,725	.....	8.8	2,255	2,072	183	.....	8.8
West Jersey.....	201	188	13	...	6 9	680,299	706,042	.....	25,743	3.6	3,385	3,756	...	371	9.9
Total. 13 roads..	10,091	9,922	169	.. .	....	67,621,501	73,344,277	227,720	5,950.496	....	6,701	7,392	....	691	....
Total inc. or dec.	.....	.....	169	....	1.7	.....	.....	.....	5,722,776	7.8	.....	... ..	....	691	9.4
SOUTHERN ROADS.															
Ala. Gt. Southern..	290	290	....	....	....	589,702	601,244	.....	11,542	1.9	2,033	2,073	....	40	1.9
Cin., N. O. & Tex. P	336	336	....	....	....	1,430,606	1,436,327	.....	5,721	0.4	4,258	4,275	....	17	0.4
E. Tenn.,Va. & Ga.	1,100	1,100	....	....	....	2 049,951	2,142,315	.....	92,364	4.3	1,864	1,948	....	84	4.3
Fla.Ry. & Nav.Co..	530	486	44	....	9.1	570,265	586.630	.....	16,365	2.8	1,076	1,207	....	131	10.9
Ill. Cent . So. Div..	711	578	133	....	23.0	2,336,933	2,150,056	186,877	.....	8.7	32.84	3,720	...	436	11.8
Louisville & Nash..	2,043	2,065	....	22	1.1	7,891,188	7,616,349	274,839	.....	3.6	3,863	3,688	175	.....	4.7
Mobile & Ohio.....	528	528	....	....	....	1,041,775	1,105,709	.....	63,934	5.8	1,973	2,094	....	121	5 8
Mem. & Charleston	292	292	....	....	....	695,140	760,572	.....	65,432	8.6	2,381	2,605	....	224	8.6
Nash.,Chat.& St. L.	574	554	20	....	3.6	1,192,885	1,332,656	.....	139,771	10.5	2,078	2,406	....	328	13.7
N. O. & Nor'east..	195	195	....	....	....	361,644	219,010	142,634	.....	65.1	1,855	1,123	732	.....	65.1
Norfolk & Western	512	503	9	....	1.8	1,447,297	1,432,327	14,970	.....	1 0	2,827	2,848	....	21	0.7
Rich. & Danville...	757	757	....	...	....	2,127,850	2,076,025	51,825	.....	2.5	2,811	2,742	69	....	2.5
Char.,Col. & Aug.	370	358	12	...	3.3	425,006	398,774	26,232	.....	6 5	1,149	1,114	35	....	3.1
Col. & Greenville	296	296	....	....	....	349,470	329,734	19,736	.....	6 0	1,181	1,114	67	...	6.0
Ga. Pacific	318	288	30	....	10.4	347,455	300,872	46,583	.....	15.5	1,093	1,045	48	.....	4.6
Va. Midland.....	352	352	....	....	....	822,728	864,010	.....	41,282	4.8	2,337	2,455	....	118	4.8
Western N. C	274	208	66	....	31.8	244,859	226.655	18,204	.....	8.1	894	1,090	....	196	18.0
South Carolina ...	247	247	...	....	....	594,130	636.595	.....	42.465	6 7	2,405	2,577	....	172	6.7
Vicks. & Meridian .	142	142	.. .	....	....	227,694	258,158	.....	30,464	11.8	1,603	1,818	....	215	11.8
Total, 19 roads...	9,867	9,575	314	22	...	24,746,578	24,474,018	781,900	509,340	....	2,508	2,556	....	48	....
Total inc. or dec.	.....	.....	292	....	3.0	.....	.....	272,560	.....	1.1	.....	.... ..	....	48	1.9
CENTRAL GROUP.															
Chi. & Eastern Ill..	252	252	....	....	....	856,587	816,766	39,821	.....	4.9	3.399	3,241	158	....	4 9
Chi. & West Mich..	413	413	....	....	....	714,620	889,095	.....	174,475	19.4	1,730	2,153	.. .	423	19.4
Cin.,Ind.,St.L.&Chi	342	342	....	....	....	1,318,730	1,299,124	19,606	.....	1.5	3,856	3,709	57	....	1.5
Cin., Wash. & Balt.	284	284	..	....	....	960.807	996,189	.....	35,382	3.6	3,383	3,508	....	125	3.6
Cleve.,Akron & Col.	144	144	....	....	....	270,770	268,115	2,655	.....	1.0	1,880	1,862	18	....	1.0
Det., Lan. & No...	258	258	....	....	....	647,438	776,937	.....	129,499	16 7	2,509	3,011	....	502	16.7
Ev. & Terre Haute.	146	146	...	....	....	409,090	407,974	1.116	.....	0.3	2.802	2,794	8	....	0.3
Flint & Pere Marq..	362	362	....	....	....	1,082,175	1,388.294	.....	306,119	21.9	2,989	3,835	...	846	21.9
Ill. Cen , Ill. lines..	953	953	....	....	....	3,517,788	3,337,757	180.031	.....	5.4	3.691	3,502	189	....	5.4
Ind., Bloom. & W.*	532	532	....	..	..	1,258.645	1,250,463	8,182	.....	0.6	2,366	2,351	15	....	0.6
N. Y., Penn. & Ohio	570	570	....	....	....	2,072,845	3,127,737	.....	454,952	14.5	4.689	5,487	....	798	14.5
Ohio & Mississippi.	615	615	...	....	....	2,021,636	2,078,109	.....	56,473	2.7	3.287	3,379	....	92	2.7
Ohio Southern.....	130	130	...	...	....	226,829	241,228	.....	14,399	5.9	1,745	1,856	....	111	5.9
Peoria, Dec. & Ev..	254	254	....	....	....	379,791	420,093	.....	40,302	9.6	1,495	1,654	....	159	9.6
St.L.,Alton & T. H :															
Main Line.....	195	195	....	....	....	647,440	753,308	.....	105,868	14.0	3,320	3,863	....	543	14.0
Belleville Line....	138	138	....	....	....	397,596	422,876	.....	25,280	6.0	2,881	3,064	....	183	6 0
Wab., St. L. & Pac.	3,315	3,609	....	294	8.2	7,830,658	8,683,156	.....	852,498	9.8	2,362	2,406	...	44	1.8
Total, 17 roads...	8,903	9,157	...	294	....	25,213,445	27,157,281	251,411	2,195,247	..	2,832	2,953	....	121	....
Total inc. or dec.	.....	.....	...	294	3.2	.....	.....	.....	1,943,836	7.2	.....	.....	....	121	4.1
NORTHWESTERN ROADS.															
Bur.,Ced.Rap.&No.	957	714	243	...	34.7	1,648,299	1,474,678	193,621	.....	11.1	1,712	2,065	....	353	16.8
Central Iowa.....	500	500	....	....	....	651,396	779,203	.....	127,807	16 4	1,303	1,558	....	255	16.4
Chi. & Alton	850	850	....	....	....	4,293,603	4,596,801	.....	303,198	6.6	5,051	5,408	....	357	6 6
Chi., Bur. & Quincy	3.470	3,330	140	...	4 2	14,185,801	13,351,221	834,580	.....	6.3	4,088	4.009	79	...	2.0
Chi., Mil. & St. P...	4,804	4.760	44	...	0.9	12,509,000	12,376,738	132,262	.....	1.0	2,604	2,600	4	....	0.2
Chi. & N. W.....	3,840	3,760	80	....	2.1	12.754,289	12,644,904	109,385	.....	0.9	3,321	3,363	....	42	1.2
Chi., St. P., M. & O.	1,314	1,294	20	....	1.6	2,981.554	3,160.309	.....	178,755	5.7	2,269	2,442	....	173	7 1
Des Moines & Ft. D	138	138	....	....	....	198,611	179.670	18,941	.....	10.5	1,439	1,302	137	...	10.5
Ill. Cent., Iowa lines	402	402	....	....	....	878,520	928,707	.....	50,187	5.4	2,185	2,310	....	125	5.4
Marquette, H. & O.	141	118	23	...	19.2	408,413	484,838	.....	76,425	16.5	2,897	4,109	....	1,212	29.6
Mil., L. S. & W....	483	372	111	....	29.8	661.131	632,437	28,694	.....	4.5	1,369	1,700	....	331	19.5
Mil. & Northern...	227	227	....	....	....	318,999	295,263	23,736	.....	8.0	1,405	1,301	104	...	8.0
Minneap. & St L..	575	378	197	...	52.1	1,091,363	991.065	100,298	.....	10.1	1,898	2,627	...	729	27.8
Wisconsin Central.	440	440	....	....	...	820,865	816,152	14,713	.....	1.8	1,888	1,855	33	....	1.8
Total, 14 roads...	18,141	17,283	858	....	....	53,401,844	52,711,986	1,426,230	736,372	....	2,944	3,050	....	106	....
Total inc. or dec	.....	.....	858	....	5.0	.....	.....	689,858	.....	1.3	.....	.....	....	106	3.5
ROADS NORTHWEST OF ST. PAUL.															
Canadian Pacific...	2,794	2,179	615	....	28 0	4,260,465	2,647,411	1,613,054	.....	60.9	1,525	1,215	310	....	25.5
Northern Pacific...	2,481	2,450	31	.. .	1.3	5,606,771	7,008.023	.....	1,401,552	19.9	2,260	2,860	....	600	21.0
St. P. & Duluth....	227	227	....	....	....	619,491	613,107	6,384	.....	1.1	2,729	2,701	28	...	1.1
St. P., Minn. & Man	1,408	1,363	45	....	3.3	3,674.375	4,290.107	.....	615,732	14.4	2,610	3,148	....	538	17.1
Total, 4 roads...	6,910	6,219	691	..	....	14,160,802	14,558,648	1,619,438	2,017,284	....	2,049	2 341	....	292	....
Total inc. or dec.	.....	.....	691	...	11.1	.....	.....	.....	397,846	2 7	.....	.. ...	....	292	12.5
SOUTHWESTERN ROADS.															
Ft. Worth & Den..	125	110	15	....	13.6	260,463	284,465	.....	24,002	8.6	2,084	2,586	....	502	19.3
Gulf, Col. & S. F..	536	536	....	....	....	724,326	896,907	.....	172,581	19.2	1,351	1,673	....	322	19.2
K. C., Ft. S. & Gulf	389	389	....	....	....	1,448,698	1,341,576	107,122	.....	7.9	3,724	3,449	275	....	7.9
Kan. C. Spr. & Mem	282	282	....	....	....	930,811	630,580	300.231	.....	47.6	3,301	2 236	1,065	....	47.6
Lit. R. & Ft. Smith	168	168	...	....	....	581,677	269,765	11,912	.....	4.4	1,677	1,606	71	....	4.4
Lit. R., M. Riv. & T.	170	170	....	....	....	165,026	176,355	.....	11,329	6.4	971	1,037	....	66	6.4
St. L., Ft. S. & W..	196	160	36	....	22.5	336,826	275,646	61,180	.....	22.2	1,719	1,723	....	4	0.2
St. L. & San Fran..	804	757	47	....	6.2	2,304.601	2.484.893	.....	180,292	7.2	2,866	3,283	....	417	12.7
Texas & St. Louis..	735	735	....	....	....	526.038	443,368	82,670	.....	18.6	716	603	113	....	18.6
Vicks., Sh. & Pac..	170	108	62	....	57.4	178,512	73,506	105,006	.....	142.9	1,050	681	369	....	54.3
Total, 10 roads..	3,575	3,415	160	....	....	7.156,978	6,877,061	668,121	388,204	...	2,002	2.014	....	12	....
Total inc. or dec.	.....	.....	160	....	4.7	.....	.....	279,917	.....	4.1	.....	.....	...	12	0.6
FAR WESTERN AND PACIFIC ROADS.															
At., Top. & S. Fe..	2,375	2,322	53	....	2.3	8,409,039	8,048.452	.....	539,413	6 0	3,541	3,854	...	313	8.1
Denver & R. G ...	1,317	1,317	....	...	....	3,265,857	2,916,960	348,897	.....	11.9	2,480	2,215	265	..	11.9
Denv. & Rio G. W.	368	368	....	....	....	516,021	408,161	107,860	.....	26.4	1 402	1,109	293	..	26.4
Union Pacific	4,476	4,256	220	....	5.1	13,529,520	13,369,716	159,804	... .	1.2	3,023	3,141	..	118	3.8
Total, 4 roads...	8,536	8,263	273	...	....	25,720,437	25,643,289	616,561	539,413	....	3,013	3,103	....	90	....
Total inc. or dec	.....	.....	273	....	3.3	.....	.....	77,148	.....	0.3	.....	.....	....	90	2.9
GRAND TOTAL:															
Total. 81 roads.....	66,023	63,874	2,465	316	....	218,021,585	224,766,560	5,591,381	12,336,356	....	3,302	3,519	..	217	....
Total inc. or dec...	.....	.....	2,149	....	3.4	.....	.....	.....	6,744,975	3.0	.....	.....	....	217	6.2

* Does not include Indianapolis, Decatur & Springfield in either year.

usual veneering, silk tapestry of different patterns is used for head linings. Another new feature is the substitution of panels of tufted tapestry in the spaces between the windows, which are usually occupied by mirrors or covered wooden panels. The steam pipes from the heater run around different apartments and are covered by wire coil. Over them is a guard rail and foot rest, covered by carpet to match that on the floors. Electric bells and annunciators are found in every apartment of the car and at each of the outer doors.

The front end is occupied by a drawing-room richly carpeted with a sage-colored Wilton. It is supplied with easy chairs and divans upholstered in silk tapestry. In order that the room may be also used as a dining room, a mahogany extension table and a mahogany buffet are supplied. The latter is paneled with beveled plate glass, the shelves and drawers being lined with velvet and containing a rich assortment of silverware and rare china.

Passing to the right from this room through a portiere one enters a handsome corridor running the remaining length of the car. Immediately on the left is the private sleeping room of Mr. Corbin. The floor is covered by sheepskin mats. An elegant sofa, upholstered in silk tapestry, occupies one side. It is convertible into an upper and lower berth, capable of accommodating four persons if necessary. The washstand is of Tennessee marble and is surmounted by a bevel plate mirror. The room also contains a large clothes press and a dressing cabinet. The tufted panels are of tapestry to match the sofa bed. Next is a private dressing room which contains one of Howard's patent railroad water closets, with flushing tank, etc. Adjoining it is another sleeping room, almost identical with Mr. Corbin's.

Next toward the rear is an open Pullman section, with a space in front with mahogany table, etc. It is separated from the corridor by hanging portieres. Immediately in its rear is the main toilet room, with Tennessee marble washstands, beveled mirrors, Howard water-closet, silver-plated racks, linen lockers, etc.

The kitchen is apparently complete in its supply of every imaginable culinary appliance. It is the first car ever built by the Jackson & Sharp Co. that contains a regular Flinn & Jackson hotel range, with copper boilers, tanks, etc. The kitchen also has refrigerator and provision closets lined with zinc, copper floor and sink, pump and hydrant and dish closets well supplied.

The smoking, observation and bath room occupies the rear end. It is elaborately finished in quartered oak. It also contains a sofa convertible into an upper and lower berth. Beneath the sofa is a bath tub, supplied with hot and cold water, shower bath, etc. The five water tanks are capable of carrying 300 gallons. The car is considered the most convenient and luxurious ever built here.—*Wilmington (Del.) Morning News.*

A New Explosive.

A new explosive, known as Hellhoffite, which has been invented by Hellhoff and Gruson, has been subjected to comparative trials at St. Petersburg, together with nitro-glycerine and ordinary gunpowder. It is described as a solution of a nitrated organic combination—naphthaline, phenol, benzine, etc.—in fuming nitric acid. In preparing the Hellhoffite tried in the experiments, binitro-benzine, a solid, inexplosive and badly burning body, was used. The trials showed that Hellhoffite possesses the following advantages: (1) In igniting it with fulminite of mercury it acts more powerfully than nitro-glycerine; (2) it may be stored and transported with perfect safety as regards concussion, as it cannot be exploded either by a blow or a shock, nor by an open flame. On the other hand, it has the following disadvantages: (1) Hellhoffite is a liquid; (2) the fuming nitric acid contained in Hellhoffite is of such a volatile nature that it can be stored only in perfectly closed vessels; (3) Hellhoffite is rendered completely inexplosive by being mixed with water, and can consequently not be employed for works under water.

Tests of Wind-Mills.

The Pennsylvania State Agricultural Society made last September tests of 5 different wind-mills, the only ones out of 15 invited which were entered for test. The mills were placed 50 ft. apart, 40 ft. above the ground, with a clear unobstructed wind space, and were tested by a continuous run from 3:45 p. m. on Sept. 18 to 4:30 p. m. on Sept. 27.

The following were the mills entered, with the diameter of wheel, weight of wheel, vane and attached iron-work and price, exclusive of derrick and pump:

	Diam. wheel.	Weight.	Price
Halladay	10 ft. 4 in.	400 lbs.†	$100
Leffel	10 ft.	500 lbs.*	85
Perkins	10 ft.	415 lbs.*	75
Kennedy	10 ft.	450 lbs.*	100
Manvel	10 ft.	390 lbs.†	85

* Exclusive of pump and rod. † Exclusive of pump only.

The following were the results of the test:

DATE (day or night).	Average wind velocity.	CUBIC FEET PUMPED.				
		Halladay.	Leffel....	Perkins..	Kennedy..	Manvel....
	Miles.					
Sept. 18 to 19	11	487	262	418	211	232
" 20 to 22*.....	7	529	264	292	315	228
" 19 to 20..	4.80	72	161	62	71	44
" 23 to 24.....	7	334	203	242	333	208
" 25	14.66	638	378	432	500	360
" 25 to 26..... ...	11.60	291	266	253	183	202
Total pumped Sept. 18 to 26, 9 days, 0 h. 45 m....		5,960	3,672	3,954	3,976	3,112

* This line gives the quantity of water pumped from Saturday evening, at 5 p. m., to Monday, at 7 a. m., with an average velocity of seven miles.

The tests seem to have been fairly conducted, and the superintendent of the tests, Mr. R. M. Hunter, comments, as follows:

"The Leffel and Manvel mills ran throughout the entire test without noise or vibration, while in case of the others there was considerable vibration, particularly in the Halladay mill, in strong winds, owing to the large pump employed, and it having its governor doubly weighted, so as to keep the wheel open as long as possible in an increasing velocity of wind.

"The above table gives a general idea as to how the various mills ran under different velocities of wind, and shows that the Halladay and Kennedy, between Sept. 19, at 3 p. m., and the 20th, at 7 a. m., when the wind velocity was between four and five miles, except a spurt at 3 a. m., when it attained 11 miles, did not do as much work as the Leffel, which had a pump offering much less resistance. In fact, it will be noted that there is much variation in the performance of the different mills, which is, apparently, contrary to any rule. One day it will be seen that one mill will accomplish much more work than another, and the next day the state of things will be reversed."

RAILROAD GAZETTE

Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

JULY EARNINGS.

Our large table has been purposely delayed in order to include some important railroads which report late. It has reports of earnings from 83 railroads, whose aggregate mileage and earnings and average earnings per mile were:

	1885.	1884.	Inc. or Dec.	P.c.
Miles	66,285	64,974	+ 1,311	2.0
Earnings	$33,175,446	$34,143,558	— $968,112	2.8
Earnings per mile	500	525	— 25	4.8

The roads reporting have about 53 per cent of the mileage worked in the United States, and the statement is more complete, we believe, than any other monthly statement ever made.

The decrease of 2.8 per cent. in total earnings and 4.8 per cent. in earnings per mile is from the earnings of last year, which, for 74 roads reporting, were 2.2 per cent. less in the total and 7.5 per cent. less per mile than in 1883, when 38 roads reported an increase of 7¼ per cent. in total earnings, but a decrease of 3 per cent. in earnings per mile. In previous months of this year the percentages of decrease in earnings per mile of the whole number of roads reporting has been :

Jan.	Feb.	March.	April.	May.	June.	July.
3.2	7.0	1.2	9.6	11.1	4.8	4.8

The rate of decrease compared with 1883 was probably nearly as great in July as in any other month.

The four railroads northwest of St. Paul report :

	1885.	1884.	Increase.	P. c.
Miles	7,145	6,485	660	10.2
Earnings	$2,602,851	$2,296,461	$306,390	13.4
Earn. per mile	364	354	10	3 0

The Canadian Pacific and the St. Paul & Duluth gain largely ; the Northern Pacific has a small loss, and the Manitoba a large one.

Five other roads in the Far West report :

	1885.	1884.	Inc. or Dec.	P.c.
Miles	8,788	8,579	+ 218	2.5
Earnings	$4,182,489	$4,192,974	—$10,485	0.2
Earn. per mile	476	489	— 13	2.7

There are very large gains by the two Denver roads and considerable losses by the Union Pacific and the Atchison, Topeka & Santa Fe. The Union Pacific has larger earnings per mile than the average railroad of the country—larger than reported by any other great railroad west of Chicago, except the Chicago & Alton, the Chicago, Burlington & Quincy and the Chicago & Northwestern.

The other railroads west and northwest of Chicago, 14 in number, report:

	1885.	1884.	Inc. or Dec.	P.c.
Miles	18,251	17,414	+ 837	4.7
Earnings	$7,921,750	$7,845,173	+ $76,577	1.0
Earn. per mile	434	451	— 17	1.4

Among them are included the Chicago, Burlington & Quincy, which is not usually in the table. Of the 14 roads nine have an increase in total earnings, but only six an increase in earnings per mile, and there is no large increase in the latter except by the Des Moines & Fort Dodge—a small road with very light earnings—while five roads have a decrease of more than 10 per cent. in earnings per mile, the largest being by the Marquette & Ontonagon, the Minneapolis & St. Louis and the Burlington, Cedar Rapids & Northern, all of which have a larger mileage this year.

Thirteen of the roads northwest of Chicago reported last year, and the earnings of these for three years have been :

	1885.	1884.	1883.
Miles	17,676	16,979	16,059
Earnings	$7,775,691	$7,680,690	$7,841,349
Earn. per mile	439	453	488

Thus these railroads northwest of Chicago, with 1,617 (10 per cent.) more miles of road than in 1883, earned $65,658 less money this year, and the decrease in their earnings per mile is fully 10 per cent.

We turn now to the group of railroads west and southwest of St. Louis, 10 of which report :

	1885.	1884.	Inc. or Dec.	P.c.
Miles	3,613	3,449	+ 164	4.8
Earnings	$1,012,780	$998,454	+ $14,326	1.4
Earn. per mile	280	289	— 19	3.1

Here the changes are small. The district is but poorly represented, the principal roads in it not reporting. Three of the ten reporting have a decrease in total earnings, and four a decrease in earnings per mile. The largest of the latter are 25½ per cent. (Fort Worth & Denver), 18 (Little Rock, Mississippi River & Texas) and 14¼ (Fort Scott & Wichita). The very large percentage of gain of the Vicksburg & Shreveport (77½) makes its earnings per mile only $148. The conditions are the reverse of those of the two years previous. The exceptionally large crops in Kansas and Missouri greatly increased the earnings of such roads as the Missouri Pacific, the St. Louis & San Francisco and the Fort Scott & Gulf, while very poor crops in Arkansas and Texas diminished the earnings of the roads in those states, and of the lines which carry their through traffic, especially the Iron Mountain and the Missouri, Kansas & Texas. This year Arkansas and Texas have large crops, and Kansas small ones ; hence we should expect a decrease in the earnings of the roads carrying Kansas traffic, and an increase—a very large one—in those of the roads further south. This does not appear very distinctly as yet, and could not be expected to as early as July, but there are signs of it in gains of the Gulf, Colorado & Santa Fe, the Springfield & Memphis, and the Little Rock & Fort Smith, as also in the decrease of the St. Louis & San Francisco, and the Atchison, Topeka & Santa Fe (given in another table). The earnings of the Gould Southwestern roads are needed to make anything like a sufficient account of the course of earnings in this district. They should increase very largely now, but very likely for some time the expenses will increase as fast as their earnings, to put the roads in proper condition for the larger traffic ; but before the end of the crop year they should show great gains in net earnings, as also the other roads in that territory, the chief of which are the Galveston, Harrisburg & San Antonio, the Houston & Texas Central and the Gulf, Colorado & Santa Fe.

We now come to the railroads north of the Ohio, east of the line between Chicago and St. Louis and west of Pennsylvania—the territory of the western connections of the eastern trunk lines, of trunk-line through rates, and of winter-wheat production. All the conditions were unfavorable this year, but as our list does not include any of the principal through rates, we shall not see the full effect of these conditions in their earnings. The aggregates of the 18 reporting are:

	1885.	1884.	Decrease.	P. c.
Miles	8,546	9,520	974	10.2
Earnings	$3,407,679	$3,924,052	$516,373	13.2
Earn. per mile.	399	412	13	3.1

The decrease of mileage is wholly in the Wabash, and consists in its least profitable lines. As a large part of its mileage belongs in the territory west and northwest of Chicago, we shall get a better idea of the general course of earnings in this territory north of the Ohio, probably, by omitting it, when we shall have for 17 railroads :

	1885.	1884.	Decrease.	P. c.
Miles	5,974	5,974	.....	...
Earnings	$2,475,001	$2,689,754	$214,753	8.0
Earn. per mile	414	452	38	8.0

Evidently, this is too small a part of the whole to be a trustworthy indicator, but it probably indicates pretty well the course on the smaller roads, and it is bad enough for the larger ones, which suffered most from the low through rates. Only four roads gain, but among them are the Illinois Central and the Belleville Line of the Alton & Terre Haute, which pass through a wheat country which ordinarily begins to ship early in July. Some of the decreases are large, as 18½ per cent. by the Cincinnati, Indianapolis, St. Louis & Chicago, 17½ by the Cincinnati, Washington & Baltimore, 22½ by the New York, Pennsylvania & Ohio, and 29½ by the Ohio Southern.

But the earnings in this territory were very bad last year also, and the aggregates of 14 roads which have reported for three years, with scarcely any change in mileage, have been :

	1885.	1884.	1883.
Earnings	$2,207,501	$2,404,854	$2,908,881

Thus while the earnings of these roads have fallen off about 8 per cent. since last year, since 1883 they have fallen off no less than 24 per cent. They have been doing very badly, in fact, and there is pressing need of an advance in their rates, the obstacles to which now seem to have been chiefly overcome.

We have reports from 19 railroads south of the Ohio and the Potomac, showing :

	1885.	1884.	Inc. or Dec.	P.c.
Miles	9,849	9,601	+ 248	2.6
Earnings	$3,202,657	$3,195,041	+ $7,616	0.2
Earnings per mile	325	333	— 8	2.4

This is a very good showing, compared with other groups. Ten of the roads had an increase in total earnings this year, and nine an increase in earnings per mile. Most of the changes are moderate, but the Southern Division of the Illinois Central, with 23 per cent. more road, had 7½ per cent. less earnings, resulting in a decrease of 25 per cent. in earnings per mile; the Memphis & Charleston lost 20½ per cent., and the Nashville & Chattanooga 14½, while the New Orleans & Northwestern gained 31½ per cent., and the Norfolk & Western 13. Contrary to what might have been expected, the Southern railroads did fairly well in July last year, the 21 reporting having a decrease of 3½ per cent. in total earnings and 5½ in earnings per mile. Eighteen of these roads that have reported for three years have had the following aggregate earnings in July :

	1885.	1884.	1883.
Earnings	$3,159,434	3,154,391	$3,438,278

There has been a small increase in mileage since 1883, and the decrease in earnings has been 8 per cent., July in 1883 being near the close of the crop year of the largest cotton crop.

There remain the Eastern railroads—those east of Ohio and north of the Potomac—13 of which report:

	1885.	1884.	Inc. or Dec.	P. c.
Miles	10,093	9,935	+ 158	1.6
Earnings	$10,845,240	$11,691,403	— $846,163	7.1
Earn. per mile.	1,074	1,177	— 103	8.8

This is a very bad showing, especially as the Eastern roads did not do well last year in July. Very large percentages of gain or loss seldom appear among the great roads which receive the greater part of these earnings, but decreases of 13½ per cent. by the Grand Trunk, 10½ by the Erie, 13¾ by the Northern Central, or even 7½ by the Pennsylvania, make large sums. Four of the 13 roads gain, but the only important gain is 7.2 per cent. by the New York & New England. Eleven of these roads have had the following aggregate earnings in July for three years :

	1885.	1884.	1883.
Miles	9,628	9,470	8,724
Earnings	$10,546,792	$11,389,309	$11 752,124
Earn. per mile	1,095	1,203	1,347

The gain in mileage has been chiefly by the Grand Trunk and in roads of light traffic and capital, so the decrease of 18 per cent. in earnings per mile since 1883 is not so formidable as it seems. There has been a very serious decline, however, and there is pressing need of doing something to make the traffic pay more, which should now be entirely practicable.

Altogether, we find the greatest decrease in earnings per mile in the East (8¾ per cent.) and north of the Ohio (8 per cent), which is the territory of trunk-line rates, where the traffic comes from nearly all other parts of the country. Comparatively small are the decreases northwest of Chicago (3.4 per cent.), southwest of St. Louis (3.1 per cent.), west of the Missouri (2.7 per cent.) and south of the Ohio (2.4 per cent.), while northwest of St. Paul there is actually a gain of 3 per cent. in earnings per mile.

July may usually be counted the end of the crop year, and the new winter-wheat crop usually has a considerable effect on traffic in that month—a great effect in California, and, when the crop is large and the demand good, a considerable effect in the Ohio Valley, Missouri and Kansas. Very little can be expected from it this year, and not much from any crops in August, except so far as the prospects affect general traffic. This year the crop movement is likely not to begin fairly till September, when spring wheat and cotton will be ready for market, and even last year's corn is likely to be marketed more freely than in the summer months.

For the seven months ending with July our table has reports from 81 railroads, with the following aggregates :

	1885.	1884.	Inc. or dec.	P. c.
Miles	66,023	63,874	+ 2,149	3.4
Earnings	$218,021,585	$224,766,560	— $6,744,975	3.0
Earn. per mile	3,302	3,519	— 217	6.2

Thirteen Eastern railroads, which have but 15 per cent. of the total mileage reporting, had 31 per cent. of the total earnings, and of the total decrease of $6,745,000, these Eastern roads suffered $5,723,000—six-sevenths of the whole. Their decrease in earnings per

mile was 9.4 per cent. The Grand Trunk, the Erie, the Pennsylvania and the Reading together have a decrease of $5,759,000, which indicates what kind of traffic has suffered most. The railroads reporting north of the Ohio have a decrease of $1,943,000 (7.2 per cent.), with some decrease in mileage. Did they all report, the decrease probably would be as great as that of the Eastern roads; for few lines in the country can have suffered more than the great roads in this territory—the Michigan Central, the Lake Shore, the Fort Wayne, the Pan-Handle, and the Trans-Ohio lines of the Baltimore & Ohio.

The Southern railroads (east of the Mississippi) make a grand showing, 19 of them earning a little more than last year, and only 2 per cent. less per mile of road. The same may be said of the group of roads (14) northwest of Chicago, which have 1.3 per cent. more total earnings and 3½ per cent. less earnings per mile than last year, having done much better in earlier months than in July.

The four roads northwest of St. Paul, on the other hand, had a larger decrease (2.7 per cent.) in total earnings, and the great decrease of 12½ per cent. in earnings per mile—all due to the Northern Pacific and the Manitoba.

Ten roads reporting southwest of St. Louis (not including the more important ones) had a gain of 4 per cent. in total earnings and a very slight loss in earnings per mile. The contrary would doubtless be the case did all report.

Four roads in the Far West have a slight increase in total earnings and a decrease of 3 per cent. in earnings per mile. The Atchison, Topeka & Santa Fe is the only one with a decrease in total earnings.

The railroads reporting include more than half the mileage in operation in the United States, but there is reason to believe that their average does not fairly represent the average course of earnings, but that the average decrease was greater than that of these 81 roads. For among the very important railroads not reporting are the New York Central, the western connections of the Eastern trunk lines, and several anthracite coal roads, all of which are known to have suffered greatly, and the Gould Southwestern roads, which have had to feel the effect of two exceptionally bad crop years in Arkansas and Texas. Judging by the table alone, we should have to conclude that the important declines were confined to the Eastern states and to the new Northwestern territory. They have actually been much more general.

The period with which the comparison is made was itself unfavorable, 72 roads reporting for the first seven months of 1884 having earned 1.3 per cent. more in the aggregate, but 5.8 per cent. less per mile of road than in the corresponding period of 1883, when 62 roads earned in the aggregate 12½ per cent. more, but per mile of road slightly less than in 1882, when 82 roads earned 9½ per cent. more in the aggregate, but 1½ per cent. less per mile of road than in 1881, when also there was a decrease (½ per cent.) in earnings per mile, in spite of the great increase of 16½ per cent. in total earnings shown by the 53 roads reporting. Thus we have had a continuous decrease in earnings per mile ever since 1880; and this decrease became large last year and is still larger this year.

August Earnings.

August earnings have been reported so far by 24 railroads, which had in the aggregate the following:

	1885.	1884.	Decrease.	P. c.
Earnings	$12,026,312	$12,133,260	$106,948	0.9

This is a quite moderate decrease, but the comparison is with a month when earnings were exceptionally light last year. A comparison of August earnings for five years will show more clearly their actual course.

Northwest of Chicago there were the following:

	1881.	1882.	1883.	1884.	1885.
Chic. & N. W.	$2,315,164	$2,211,622	$2,103,459	$2,027,700	$1,928,000
St. P. & O.	376,897	422,718	495,620	469,500	475,400
C., Mil. & St. P.	1,678,391	1,545,198	1,851,209	1,855,348	1,767,000
St. P. & Duluth	73,092	104,548	140,567	126,253	125,118
North. Pac.	434,085	727,215	1,043,624	1,032,602	975,898
Ill. Cen., Iowa lines	196,372	160,581	166,472	125,742	116,558
Mil., L. S. & W.	59,931	75,170	100,585	96,031	131,305
Total	$5,153,812	$5,247,002	$6,200,986	$5,733,176	$5,517,279

All of these roads, except the St. Paul & Duluth and the Illinois Central, have largely increased their mileage of late years, but we see that their aggregate earnings this year were 3.8 per cent. less than last year and 11 per cent. less than in 1883, and but little more than in 1880 and 1881. The Northwestern was working less than 3,000 miles in 1881, and more than 3,850 this year, and its earnings per mile have decreased from about $770 to $500; the Milwaukee & St. Paul has increased its mileage from 3,900 to 4,800, and its earnings per mile have fallen from $430 to $368; the St. Paul & Omaha has an increase of 35 per cent. in mileage, and of but 26 per cent. in earnings. The Northern Pacific earned 5½ per cent. less than last year and 6½ per cent. less than in 1883, before it was completed; though in 1883 doubtless a very considerable part of the earnings were for carrying its own construction materials. The Iowa lines of the Illinois Central, which have not changed their mileage, earned less than in any other year of the five and 40 per cent. less than in 1881. Even the St. Paul & Duluth shows an important decrease since 1883, though it has a great gain since 1881. The Milwaukee, Lake Shore & Western, whose length has nearly doubled since 1881, alone shows a continuous and large increase in earnings.

In this quarter, therefore, the August earnings have not been at all encouraging. The month is the end of the crop year in this section, and the effect of the new harvest will not be felt much till September.

South and southwest of Chicago August earnings for these five years have been:

	1881.	1882.	1883.	1884.	1885.
Chic & Alton	$760,751	$856,398	$886,556	$859,902	$724,346
I. C., I. & S. D.	930,165	922,833	926,822	822,552	831,797
Chic. & E. Ill.	156,497	170,380	158,061	150,514	146,499
Peo., D. & Ev.	86,250	75,723	76,481	79,835	80,085
St. L. & San F.	281,852	394,907	376,396	432,927	359,000
Total	$2,224,525	$2,420,241	$2,424,316	$2,345,730	$2,141,727

The increase in the mileage of these roads has not been great, and the decrease in their earnings is less than in the case of the Northwestern roads. It is 8¾ per cent. from last year, 11⅞ from 1883, 11½ from 1882, and 3¾ from 1881. The large decreases from last year are 16 per cent. by the Chicago & Alton and 17 per cent. by the St. Louis & San Francisco.

East of Chicago earnings have been:

	1881.	1882.	1883.	1884.	1885.
Chic. & W. Mich.	$120,292	$125,722	$151,286	$118,130	$103,414
Cin., I., St. L. & C.	237,284	237,496	246,517	244,117	199,534
Det., Lan. & N.	131,686	134,659	152,348	116,801	109,904
Long Island	274,650	357,916	391,007	389,258	380,904

All these roads except the Long Island earned less this year than in any other of the five, the largest decrease from last year being 18 per cent. by the Cincinnati & Indianapolis. The decrease from 1883 is 32 per cent. on the West Michigan, 19 by the Cincinnati & Indianapolis, 28 by the Lansing & Northern, and 3⅛ per cent. by the Long Island.

In the South there are reported for August:

	1881.	1882.	1883.	1884.	1885.
Louis. & N.	$876,192	$1,043,912	$1,251,127	$1,116,312	$1,070,895
N. & West.	196,122	222,160	261,711	220,188	219,770

The Louisville & Nashville earned this year 4 per cent. less than in 1884 and 14½ per cent. less than in 1883. The Norfolk & Western earned nearly the same as last year, and as in 1882, and 1881, but 16 per cent. less than 1883.

Earnings Per Mile in July.

We give below a table of the earnings per mile of 73 railroads in the month of July for six successive years, or for as many of these years, not less than three, as the information is accessible:

Railroad Earnings in July 1880 to 1885.

	1880.	1881.	1882.	1883.	1884.	1885.
Ala. Grt So.	$164	$199	$210	$249	$255	$242
Atch. Top. & S F.	470	602	614	652	548	498
B., Hoosac T. & W.	....	....	....	558	494	477
Burl., C. R. & N.	292	309	307	281	276	227
Canada Pac.	....	....	377	321	228	325
Cen. Iowa	....	467	316	252	193	172
Char., Col. & Aug.	161	180	171	135	110	124
Chic., Burl. & Q.	682	680	513	566	514	519
Chic. & Alton	844	807	827	860	860	777
Chic. & E. Ill.	519	568	619	479	510	448
C., Mil. & St. P.	330	413	342	465	410	394
Chic. & N. W.	682	708	634	602	525	540
Cn., St. P., M. & O.	304	403	346	380	359	355
Chic. & W. Mich.	231	....	303	293	305	272
Cin., L. St. L. & C.	680	590	566	556	613	500
C., N. O. & T. P.	....	565	664	680	675	664
Cin., W. & Balt.	....	....	562	517	499	413
Clev., Ak. & Col.	197	207	274	305	286	307
Col. & Greenville	....	....	118	118	104	107
Denver & R. G.	737	647	459	394	304	415
Des M. & Ft. D.	336	427	281	183	172	212
Det., L. & N.	444	499	544	467	379	363
E. T., Va. & Ga.	252	247	262	231	253	272
Ev. & Terre H.	....	421	759	406	505	453
Flint & P. M.	378	432	431	531	477	418
Ft. Worth & D.	....	....	....	254	458	341
Grand Trunk	....	....	....	608	557	483
Gulf, C. & S. F.	....	254	226	311	236	253
Ill. Cent:						
Ill. Lines	640	597	671	560	487	521
Iowa Lines	339	426	349	384	318	320
Ill Cen., So. Div.	354	347	385	416	415	312
Ind., Bloom. & W.	488	359	295	313	325	315
K. C., Ft. S. & G.	313	382	371	365	453	478
Lake Erie & W.	327	322	274	202	198	194
Long Island	....	744	996	1,072	1,036	1,054
L. R., Miss. R. & Tex.	....	....	114	139	142	116
L. R. & Ft. Smith	....	....	163	183	195	217
L. & Nashville	454	444	525	545	513	525
Marq., H. & O.	....	1,759	1,833	1,388	1,019	779
Mem. & Charleston	235	308	294	307	361	287
Mil., L. S. & W.	137	199	251	271	259	220
Mil. & North.	....	....	....	204	185	198
Mobile & Ohio	258	268	256	255	245	224
Nash., C. & St. L.	334	322	343	353	338	289
N. Y., L. E. & W.	1,660	1,823	1,798	1,645	1,356	1,217
N. Y. & New Eng.	746	781	754	802	691	740
N. Y., Pa. & Ohio.	776	762	810	1,075	842	654
N. Y., Susq. & West	....	....	791	607	660	685
Norfolk & West.	340	405	447	439	389	411
Northern Cen.	1,382	1,352	1,505	1,474	1,483	1,279
Northern Pac.	534	521	534	500	417	378
Ohio Southern	....	173	199	212	272	193
Ohio & Miss.	....	....	....	542	459	461
Pennsylvania	1,843	2,000	2,124	2,017	1,877	1,623
Peoria, D. & Ev.	225	209	290	180	216	207
Ph. & Reading	1,516	1,847	2,026	1,910	1,774	1,693
Rich. & Danville	323	341	323	360	331	360
Roch. & Pitts.	....	....	....	286	374	377
St. L., A. & T. H.:						
Main line	708	609	672	552	462	416
Belleville line	745	384	609	403	323	379
St. L., Ft. S. & W.	....	....	....	158	264	227
St. L. & San Fran.	361	426	483	373	463	404
St. P. & Duluth	262	408	493	657	526	625
St. P., M. & Man.	415	456	936	454	433	375
South Carolina	$253	$263	$282	$304	$240	$248
Union Pac.	633	732	618	524	558	515
Vicks. & Meridian	...	223	187	207	227	208
Vicks., S. & Pac.	....	....	3	38	58	87	148
Va. Midland	....	....	349	418	373	370
Wabash	552	456	424	341	348	303
Western N. C.	....	....	106	158	172	142
West Jersey	....	....	982	947	950	843
Wis. Central	....	150	153	248	245	260

We have here the July earnings per mile of road of 73 railroads for three years or more, and these give a better idea of the course of earnings than is possible from any comparison of this year with last. It will be found that of 73 roads

44 earned less per mile than in 1884
and 52 " " " " " 1883

so that decreases since 1883 have occurred on nearly three-fourths of the roads.

Also the earnings per mile

of 46 out of 66 roads were less in 1885 than in 1882
of 42 " " 56 " " " " " " 1881
of 29 " " 47 " " " " " " 1880

Those which have gained in earnings per mile since 1880 are mostly railroads which had light earnings then and have established themselves since. Among them are the St. Paul & Omaha, the West Michigan, the Flint & Pere Marquette, the Fort Scott & Gulf, the Louisville & Nashville, the Milwaukee, Lake Shore & Western, the Norfolk & Western, the Northern Pacific, the Reading, the Richmond & Danville, the St. Louis & San Francisco, the St. Paul & Duluth, and the Atchison, Topeka & Santa Fe, several of which have earned much less this year than in some years since 1880. The number of roads which had *larger* earnings per mile in July this year than in any other of the six is small—the Cleveland, Akron & Columbus, the East Tennessee, the Fort Scott & Gulf, the Richmond & Danville (the same as in 1883), the Vicksburg, Shreveport & Pacific, the Wisconsin Central, the Rochester & Pittsburgh and the Little Rock & Fort Smith—mostly small and new roads; those having *smaller* earnings per mile this year than in any other reported since 1879 are the Burlington, Cedar Rapids & Northern, the Central Iowa, the Chicago & Alton, the Eastern Illinois, the Cincinnati, Indianapolis, St. Louis & Chicago, the Cincinnati, Washington & Baltimore, the Detroit, Lansing & Northern, the Iowa lines and the Southern Division of the Illinois Central, the Marquette & Ontonagon, the Mobile & Ohio, the Nashville & Chattanooga, the Northern Central, the New York, Lake Erie & Western, the Pennsylvania, the St. Louis & Terre Haute Main Line, the Manitoba, the West Jersey, the Grand Trunk, the Lake Erie & Western, the New York, Pennsylvania & Ohio and the Union Pacific—truly a formidable list.

A study of this table shows better than anything else we know the extent, generality and long continuance of the decline of railroad earnings. It is hard to believe that it can go any further, and unless there shall be an unexpectedly large amount of new railroad built, we do not believe that it will, though no great increase, except in the South and Southwest, is to be expected immediately from the growth of traffic; while the lines carrying much through trunk-line traffic can gain very largely simply by charging proper rates, though they cannot with them expect such earnings as they had three or four years ago.

The Effect of Speed on Fuel Consumption.

As the tendency even now is to increase the speed of freight trains, and this tendency is likely to grow stronger, the question raised in the discussion of fuel consumption on railroads in another column, by the assertion that the train resistance increases directly with the speed and the fuel burned directly with the train resistance, possesses more than a theoretical interest. The specific claim which we disputed was (1) that an increase of 15 per cent. in the speed of freight trains (more exactly, 14.3 per cent.; from 17½ to 20 miles per hour) would increase the train resistance 15 per cent., and (2) that 15 per cent. more train resistance meant of necessity 15 per cent. more coal burned.

Both theory and experience seem to be so far against these assumptions that it is doubtful if 15 per cent. higher speed (for speeds under 20 miles per hour) involves any increase whatever in the coal burned, under fair conditions; and it is quite certain that neither the resistance nor the coal burned vary in anything like direct ratio either with the speed or with each other.

As respects the resistance, it is universally admitted, in so far as it varies with speed at all, to vary as the square of the speed, and hence there must of course be *a point* where 15 per cent. more speed on a level means 15 per cent. more train resistance. At 60 miles per hour, for example, an increase of 15 per cent. in speed, to 69 miles per hour, would mean nearer to 50 than 15 per cent. increase in train resistance. On the other hand, an increase from five to six miles per hour, or 20 per cent., makes little if any difference.

Between these limits there must be a point, naturally, where the law is as stated; but this point is far above 20 miles per hour. D. K. Clark's formula,* the usual English standard, gives 9.76 and 10.33 lbs. rolling friction, at 17½ and 20 miles per hour, or less than 6 per cent. difference. The newer American tests, (and also foreign tests, to some extent) indicate less constant resistance and a rather more rapid increase in resistance from velocity, which would tend to increase the percentage of difference, although hardly to so great an amount as 15 per cent. But whether they would or not is of small moment, as the grade resistance, not heretofore considered, is a *constant* element per mile independent of speed, and will average on almost any railroad in the world at least equal to the rolling friction proper, while on most American roads it would reduce the percentage of increase of *total* resistance for the increase of speed noted to very small proportions.

Whether even this is so or not, however, is the less important because it is still less true that the consumption of fuel per mile is "in direct ratio" to the resistance. There are various items, such as the fuel burned in getting up steam, lost by radiation, by stopping and starting, by standing idle at stations, by interior radiation into the exhaust, etc., etc., which are in anything but "direct ratio" to the resistance between stations or to the speed; the latter very important source of loss being rather in inverse ratio both to the speed and the power exerted. At the most, not over 60 to 70 per cent. of the total fuel burned can be assumed to vary directly with the resistance between stations; and in view of the greater importance of the interior radiation into the exhaust, which is known to decrease rapidly as the piston speed and point of cut-off increases; and in view, also, of the fact that the loss by radiation, while increasing no doubt with speed, would hardly increase so greatly as to make up for the gain by decrease in the *time* of exposure, it would hardly seem probable on theoretical grounds that there should be more than 5 to 8 per cent. increase in fuel consumption for an increase of 15 per cent. in the resistance at speed between stations; and hence a very much less increase, if indeed there should be any whatever, in the fuel consumption for an increase of 15 per cent in speed above 17½ miles per hour.

This conclusion, at any rate, is in accord with tests made some years ago on the Lake Shore & Michigan Southern Railway* which still remain, so far as we now recall, the most careful and thorough observations on fuel consumption at different freight speeds which have so far been made, and in which the conclusions reached were expressed as follows:

"We found that, with the long and heavy trains of the Lake Shore & Michigan Southern Railway, of 650 to 700 tons, it required less fuel with the same engine (No. 485, Mogul) to run trains at 18 to 20 miles per hour than it did at 10 or 12 miles per hour. The engine, at the highest rate of speed, seems to produce its power more economically by using its steam expansively to a greater extent than at the slower speeds."

The correctness of the explanation here offered for the observed phenomenon (which is plainly nothing more than a guess) may be questioned; it is far more probable that the saving came from less waste of heat by interior and exterior radiation, because of the shorter time for exposure. But of the correctness of the fact itself there can be no reasonable question; as the tests were carefully made under as nearly equal conditions as possible, and the result simply depended on correct weighing of the coal.

The following observed dynamometer resistances, computed by dividing the entire work done by the locomotive by the whole distance run and by the weight of the train, were given in the same connection; they *include* the resistance of grades, which latter, however, would on the road named be a small percentage:

Train. Cars.	Train. Tons.	Run, miles.	Speed, miles per hour.	Resistance. Lbs. per ton.	Resistance. Av. H. P.
30	590	100	20	7.45	234
37	709	95½	20	6 85	264

These also afford little support for the theory that there is any important increase of resistance up to 20 miles per hour; but the correctness of the conclusions as to fuel consumption does not depend on any nice calculations of dynamometer cards, but on the direct weighing of the coal in a number of successive test trips, in which there was always a moderate percentage of economy in the higher speed.

The increase of through shipments of freight from New York, which we have noted from month to month as following the great reduction in west-bound rates, was not so large in August, when the shipments were 6½ per cent. more than last year, while in July the increase was 11 per cent. and in June 15. For nine successive years the through shipments from New York in August have been.

Year.	Tons.	Year.	Tons.
1877	71,791	1882	115 862
1878	74,830	1883	96,991
1879	67,322	1884	101,040
1880	92,042	1885	107,500
1881	120,886		

The shipments this year were exceeded only in 1881 and 1882, but the increase over last year is not what was to be expected from the great reduction in rates and the effect on shipments of a similar reduction in 1881.

The through shipments of freight of all kinds from Chicago last August, as shown by the complete report, were 174,358 tons, against 124,000 of flour, grain and provisions as given in the imperfect weekly reports telegraphed from Chicago. The total is a larger amount than has been shipped in August in any previous year except 1881. The total August shipments for seven years have been, in tons:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
162,263	109,314	260,608	138,241	166,271	146,922	174,385

Thus the shipments this year were 18½ per cent. more than last year, 5 per cent. more than in 1883 and 26 per cent. more than in 1882. If rates had been fair the traffic would have been satisfactory.

For the eight months ending with August the shipments have been:

Year.	Tons.	Year.	Tons.
1879	1,786,193	1883	1,594,682
1880	1,514,080	1884	1,911,275
1881	1,889,397	1885	2,186,382
1882	1,329,438		

Thus the total shipments for the eight months have been larger this year than ever before—14½ per cent. more than last year, 40 per cent. more than in 1883, and 64 per cent. more than in 1882. In every month of this year except April and June the shipments have been larger than last year. The shipments for the eight months exceed those of the whole year 1882.

The result of the voyage of the "Alert" to Hudson's Bay goes near to proving that the route is impracticable for the export of wheat from Manitoba and the Canadian Northwest. It was fast in the ice July 4, and not till August did it succeed in entering the bay, and the straits are likely to be closed or dangerous to navigation by the end of September, which is as soon as Manitoba wheat can be ready to market. Apparently a steamer could hardly expect to make more than two trips a year between the head of the bay and Liverpool, and these when the Manitoba wheat has been held nine or ten months. It is not probable that any vessel could be chartered to carry wheat by this route to Liverpool for anything like as little as the present cost of shipping from Port Arthur, on Lake Superior, by lake and river to Montreal, or lake and canal to New York, and thence by sea. Indeed, this cost is so very little that the transportation by rail from the farms to Lake Superior is much more important. The distance from Port Arthur to Winnipeg is 429 miles, nearly the same as from St. Paul to Chicago, and less than from Omaha or Kansas City to Chicago. The wheat-growing country begins west of Winnipeg, but extends very far to the west. With a traffic in both directions well established, rates from Port Arthur should be about as low as from Chicago or Duluth, and the country west of Winnipeg should have to pay about as much for transportation as that west of Omaha and Kansas City, provided the Canadian Pacific makes rates as low as the Chicago roads charge from Missouri River points. It will hardly do this, if it can help it, however. The Chicago roads get support for the 500 miles of their lines from a thickly peopled and very productive country bordering them from one end of the railroad to the other, while on the 429 miles between Port Arthur and Winnipeg there can be very little local traffic, and the railroad, therefore, must be supported by its through business.

Chicago, Burlington & Quincy Earnings in July.

The July earnings of the Chicago, Burlington & Quincy Railroad were lighter than any of the previous months except January last year, and less than any except January and February in 1883; this year they are less than in any month except February, but the decrease from June is only $180,000, while last year it was $342,000. The mileage, gross and net earnings and working expenses of the road in July for six successive years have been:

Year.	Miles.	Gross earnings.	Expenses.	Net earnings.
1880	2,597	$1,774,643	$749,393	$1,024,250
1881	2,712	1,888,358	942,495	945,863
1882	3,168	1,625,006	873,820	751,186
1883	3,223	1,824,705	1,039,751	784,955
1884	3,359	1,735,199	1,092,405	642,784
1885	3,490	1,812,834	1,117,857	694,977

Thus the gross earnings were $77,635 (4½ per cent.) more this year than last, the working expenses $25,452 (2⅓ per cent.) more, and the net earnings $52,193 (8 per cent.) more. The gross earnings were exceeded in 1881 and in 1883, and the net earnings in every year except last year, being 11½ per cent. less than in 1883, and 32 per cent. less than in 1880. The light corn receipts of this and recent years affect this road more than any other.

The earnings and expenses of this road for the seven months ending with July, for the last six years, have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1880	$11,433,248	$5,397,117	$6,036,131
1881	10,986,905	5,883,098	5,103,807
1882	10,781,121	6,139,423	4,641.698
1883	13,229,908	7,063,407	6,166,501
1884	13,351,220	7,549 456	5,801,764
1885	14,185,801	8,335,179	5,850,622

Thus gross earnings and working expenses were greater this year than ever before, but the net earnings less than in 1880 and 1883. Compared with last year and 1883 the increases and decreases this year are:

Since 1884:	Gross earnings.	Expenses.	Net earnings.
Amount	Inc., $834,581	Inc, $785,723	Inc., $48,858
Per cent	6.2	10.4	0.8
Since 1883:			
Amount	Inc., 955,893	1,271.772	Dec., 315,879
Per cent	7.2	18.0	5.1

Thus with 250 more miles of road than in 1883, the company has made $316,000 less profit, but it has gained slightly over last year, and just about enough to meet the dividend on the addition to the capital stock.

The fall prospect, so far as crops are concerned, is much like that of last year, except that there is very little wheat to be taken from Kansas this year, while there was a great deal last year. There will be more corn in the country tributary to this road than last year even, and last year's good crop may be felt (in the fall months) more this year than last, since there is so large a stock now in farmers' hands that with the good new crop to feed and store, they can spare large quantities of old corn; and the stock of hogs, which last year had become comparatively small, as the result of three successive light crops, has doubtless been much increased the past year, and will make it possible to fatten, ship and pack more than in any year since 1881. The earnings of this road fell off more in the last five months of last year, however, than in the first seven. Gross and net, they have been in the five months, from August to December:

	1880.	1881.	1882.	1883.	1884.
Gross.	$9,021,246	$10,189,190	$10,769 684	$12,880,461	$12,132,451
Net.	5,055,459	5,498,288	6 240,786	7,163,238	6,613,339

In the first seven months of 1884 the net earnings were $365,000 less than in 1883; in the last five months, $550,000 less.

This road's earnings usually increase very largely in August over July, but the lack of a winter wheat movement this year tended to make the increase less than usual. How great the difference between July and August earnings is, is shown below, where they are given for five years:

	1880.	1881.	1882.	1883.	1884.
July	$1,774,643	$1,888 358	$1,625,006	$1,824,705	$1,735,199
August	1,834,321	2,173,345	2,086,857	2,495,124	2,447.494

Thus the earnings have been larger in August since 1880 by from $285,000 to $712,000, the difference being greatest last year.

Erie Earnings in July.

The report of the New York, Lake Erie & Western for July shows larger net earnings than in any previous month of this year, but smaller gross and net earnings than in any other July since 1879.

The gross and net earnings and working expenses of the Erie proper in July for seven successive years have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1878	$1,157,091	$830,982	$326,709
1879	1,273,533	957,683	315,850
1880	1,580,975	1,014,658	566.317
1881	1,787,080	1,114,673	672,407
1882	1,850,260	1,122.989	727,271
1883	1,694,687	1,131,165	563,522
1884	1,458,186	1,007,307	450,879
1885	1,308,180	878.779	429.401

Compared with last year and with 1882 (when earnings were largest), the decreases have been:

Since 1884:	Gross earnings.	Expenses.	Net earnings.
Amount	$150,006	$128,528	$21,478
Per cent	10.3	12.8	4.8
Since 1882:			
Amount	542,080	244,210	297.870
Per cent	29.3	21.8	41 0

The decreases in gross earnings and expenses since last year are very large; the decrease in expenses is nearly the same as from 1883 to 1884. Since 1882 the net earnings have fallen off nearly three-sevenths.

The gross and net earnings and working expenses of the New York, Pennsylvania & Ohio Railroad in July for the three years under the lease have been:

	1883.	1884.	1885.
Gross earnings	$612,896	$480.062	$372,854
Expenses	363,518	336,029	312.387
Net earnings	$240,378	$144,033	$60,467
Rental	196,127	153,620	119,313
Profit	$53,251		
Loss		$9,587	$58 846

This is an eloquent testimonial to the destructive effects of the low through rates that have prevailed, and still prevail. This railroad, having a considerable traffic, earned net on its 570 miles of road last July only $106 per mile, and its working expenses, which have been cut down to the utmost, were 84 per cent. of its earnings. Since last year, when through freight rates to the East were also very low, there has been a decrease of 22½ per cent. in gross and 58 per cent. in net earnings. Since 1883, when doubtless this road was getting more than its share of the traffic, the decrease has been nearly 40 per cent. in gross and 76 per cent in net. The loss by the lease, however, was but $59,000.

Adding the profit and subtracting the loss on this lease from the net earninge of the Erie proper, we have as the income of the Erie from both roads:

1883.	1884.	1885.
$616,773	$441,292	$370,555

which figures are to be compared with the net earnings of the Erie proper in years previous to 1883.

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*Resistance in lbs. per ton of 2,240 lbs. $= 8 + \frac{v^2}{171}$.

*Transactions Am. Soc. Civil Engineers, Oct., 1876, p. 344, Experiments and Tests by P. H. Dudley.

For the ten months of its fiscal year ending with July, the gross and net earnings and working expenses of the Erie proper (excluding the leased Ohio road) have been:

	Gross earnings.	Expenses.	Net earnings.
1877–78	$12,860,778	$8,902,162	$3,958,618
1878–79	12,999,203	9,385,218	3,613,985
1879–80	15,299,817	9,657,940	5,641,877
1880–81	17,208,511	11,008,190	6,200,321
1881–82	16,252,416	10,924,092	5,328,324
1882–83	16,401,064	11,336,019	5,065,045
1883–84	14,351,811	10,269,772	4,082,039
1884–85	12,547,732	8,865,710	3,682,022

Compared with last year the decreases are:

	Gross earnings.	Expenses.	Net earnings.
Amount	$1,804,079	$1,404,062	400,017
Per cent	12.6	13.7	9.8

Compared with 1880–81, when gross and net earning were largest, the decreases are:

	Gross earnings.	Expenses.	Net earnings.
Amount	$4,660,779	$2,142,480	$2,518,299
Per cent	27.1	19.5	40.6

In these four years, therefore, the net earnings have decreased more than two-fifths.

The New York, Pennsylvania & Ohio for the ten months this year and last has had:

	1885.	1884.	Decrease.	P. c.
Gross earnings	$4,137,674	$4,882,404	$744,730	15.3
Expenses	2,989,738	3,651,569	661,831	18.1
Net earnings	$1,147,936	$1,230,835	$82,899	6.7
Loss on lease	176,020	331,534	155,514	47.0

The decrease in gross earnings is greater (15.3 per cent. against 12.6) than on the Erie proper; the decrease in net earnings less (6.7 per cent. against 9.8). Nearly nine-tenths of the large decrease in gross earnings is offset by the decrease in working expenses. In 1883 (the lease having been in force but three months), there was a *profit* of $155,142, and the Erie's income from the two roads for the ten months has been:

1883.	1884.	1885.
$5,220,187	$3,750,505	$3,506,002

which should be compared with the net earnings of the Erie proper in previous years. The decrease from last year is but $244,503, but from 1883 it is $1,714,185 (33 per cent.), and from 1880–81 it is $2,694,319, or 43½ per cent.

The reduction in the rental of the leased Ohio road has had much to do with keeping down the decrease in profits this year. The gross earnings of the two roads have fallen off $2,548,809 since last year, but the Erie's income from them has been reduced but $244,503. Expenses have been reduced $2,065,893, and the rental $238,314. The aggregate rental for the ten months, however, was but $1,318,056, and the lessee guarantees a minimum rental of $1,757,055. Therefore, should the gross earnings of the leased road in August and September fall below $1,371,410 (on which the rental would be $438,999), the Erie will have to make up the balance. This is more than the earnings of any *three* months so far this year, and more than this road has ever earned in August and September, except in 1883.

Consumption of Coal per Mile on English and American Railroads.

The *Engineer* of Jan. 23, 1885, presented some statistics of a kind not readily accessible, and even, the *Engineer* claims, never before made public, giving a very clear idea as to what is really *average* English practice in fuel consumption. As the *Engineer* truly says:

"Concerning this there is much ignorance. A paper is read now and then, or an authoritative statement is made, or an experiment is carried out; from which the world learns that a particular engine burns 26 lbs. of coal per train-mile, let us say; but next to nothing is known outside a limited circle concerning the real consumption of fuel, taken all round, on a great railway."

The *Engineer* continues:

"Some time since we applied to the locomotive superintendents of a number of the principal railways in Great Britain for information concerning the quantities of fuel burned in conducting the operations of their railways. Some locomotive superintendents have not as yet seen fit to make any reply to our application; others courteously declined to give information, but the others, we are happy to say, responded cheerfully to our request, and furnished us with figures of very wide interest, and we believe now for the first time made public in an accessible form."

The inquiry was intended to find out what was the gross consumption of coal per train-mile in 1873 and 1883, in order to give some idea of the success which has attended the various improvements during that period in the locomotive engine. It is also noted that "gross consumption" is a different matter from the consumption per engine-mile, and is not comparable with statements concerning the consumption per train-mile on a given trip or group of trips. The results given were obtained by dividing the whole quantity of coal burned in any given year by the number of train-miles—goods, mineral, passenger and all—run in the same period. The *Engineer* fears that this may be considered "a very crude kind of statistical information," but as this is precisely the way in which the statistics of American fuel consumption, given below, are determined, it is precisely what would be desired here for comparison.

The figures seem to indicate that there is a less considerable (although still considerable) difference in the fuel burned per train-mile than is often assumed and granted, when the comparison is made on a fair basis; and they can also be made of some interest as indicating what there is to show for the fuel in work performed, here and in England; in which we are able to make a more creditable showing than by comparison of the fuel accounts alone.

The statistics first presented are for the Great Eastern Railway, noted as a type of line with a very heavy mixed traffic: fast passenger service, fast fish and milk trains, heavy coal and freight trains, and a severe metropolitan traffic; with steep and long inclines, and many sharp curves.

To give an idea of the increase in the passenger traffic, the diagram, a reduced copy of which will be found elsewhere, was presented to show the exact style of the vehicles and the length of the trains at different dates. It will be clear from it that progress is not confined to this country.

GREAT EASTERN RAILWAY.
Statistics of Locomotive Work, 1883 and 1873.

	1883.	1873.	Inc p. c.
Passenger-miles	8,834,468	5,217,810	69.2
Goods-miles	4,844,935	3,714,672	30.4
Total train-miles	13,679,403	8,932,482	52 0
Pilot'g, shunt'g, ballast'g, etc.	3,397,205	1,886,697	80.2
Total engine-miles	17,076,608	10,819,179	57.8
Total cons'n tons coal	280,645	166,100	69.2
Coal per train-mile, lbs	45 96	41.65	10.35
" engine-mile, lbs	36.81	34.39	7.05
First-class goods engine:			
Diam. of driving wheels	4 ft. 10 in.	5 ft. 3 in.	8.6*
Cylinders	17½ × 24	16½ × 24	12.4
Total working weight, lbs	84.000	70,700	21 6
Working pressure	140 lbs.	140 lbs.	0.0
Coal train:			
Consumption per mile	46.68 lbs.	43.75 lbs.	6.78
Speed, miles per hour	20	17.4	15.0
Average load	438½ tons.	398 tons.	10.2
Cons'n per m. with av. load, 400 tons	42 58 lbs.	43.97 lbs.	D. 3.17

* Increase per cent. in *power*, due to decrease of drivers. The *total* increase in power of the engine, due both to decrease of drivers and increase of cylinders then becomes 108.6 × 112.4 = 122.3, or 22.3 per cent. increase; almost exactly equivalent to the increase of weight.

We have added the percentage column to this and the following tables, in order to illustrate the changes more fully. The high average speed of English trains and the small power of a "first-class goods engine" compared with our usual present practice on lines of heavy traffic, are especially noticeable. The tendency of switching mileage to increase comparatively is shown in this table to prevail quite as strongly on some roads in England as here. While the freight *paying* mileage has increased 30 per cent., the freight *switching* mileage has increased 80 per cent.

The *Engineer* makes the curious claim that the above figures really show an economy of 15 per cent. more or less in the fuel consumption because the speed is greater—an assumption in which we cannot follow them. It is deduced—after first demonstrating at some length what it would seem might be supposed to be self-evident, that if the resistance is the same the power required *per mile* is the same, whatever the speed, by assuming (1) that the resistance "may increase 15 per cent. while the speed increases in like ratio," which is a new contribution to engineering formulæ, and that "the resistance is the direct measure of the consumption per mile," which is another.

For reasons specified elsewhere, it would seem probable that, as a matter of fact, it is in no way true that "if the resistance has augmented 15 per cent., while the coal bill remains unchanged, it follows that the locomotive engines of 1883 are 15 per cent. better than those of 1873;" but rather that there is little if any difference in fuel consumption due to the difference in speed.

Returning to the valuable statistical data presented by the *Engineer:* The Great Western Railway, of 7 ft. gauge, a line with heavy mixed traffic, but level or nearly so for a great portion of its length, makes the following showing, interesting because the weights of the trains and the speeds are very nearly now what they were ten years ago. The Great Western trains ran at higher speeds than those on any other line even long before 1873, and the other railroads have only been doing recently that which the older line had already done. The saving effected in fuel, therefore, can be estimated without any complication. We rearrange the table to correspond with the one above:

GREAT WESTERN RAILWAY.
Statistics of Locomotive Work 1883 and 1873.

	1883.	1873.	Inc p. c.
Passenger-miles	13,162,620	8,591,879	54.2
Goods-miles	17,965,142	11,185,108	60.6
Total train-miles	31,127,762	19,716,987	58.0
Shunting, etc. pass.	905,923	778 614	16 3
" " frt	4,430,987	2,282,881	94.3
Total engine-miles	36,464,672	22,778,482	60.3
Total coal, tons	523,831	367,328	42 7
Coal per train-mile	*27.5 / †45.2 — 37.69	*29.0 / †51.4 — 41.73	5.1 / 12.0 — 9.8
" " engine-m.	*25.7 / †36.2 — 32.17	*26.6 / †42.7 — 36.12	3.1 / 15 0 — 10.8
P. c. of total *train* mile, passenger	42 3	43.3	....
P. c. of total *train* mile, freight	57.7	56.7	...
Total	100.0	100.0	.
P. c. of total *engine* miles, passenger	38.6	40.9	..
P. c. of total *engine* miles, freight	61.4	59.1	....
Total	100.0	100.0	....
Miles operated	2,268	1,502	51.8

* Passenger. † Freight.

A saving of some 4 lbs. per train-mile, or 9.8 per cent., appears here, chiefly in freight service; all conditions of trains and speed being essentially the same. The tendency of switching mileage to grow is exemplified here also, but slightly. In 1873 it was only 20.5 per cent. of the freight train-mileage, and in 1883 24.6 per cent.

The London, Brighton & South Coast, which may be called a first-class passenger line with a heavy metropolitan traffic, quick speeds, heavy trains, crooked and hilly roads, and comparatively small mineral traffic makes the following showing:

LONDON, BRIGHTON SOUTH COAST RAILWAY.
Statistics of Locomotive Work, 1873 to 1884.

Year.	Train-miles.	Engine-miles.	Fuel consumed. tons.	Consumption per mile. Train.	Engine
1873	5,300,022	6,207,807	102.517	43.33	36.99
1874	5,462,940	6,472,341	105,959	43.45	36.67
1875	5,773,860	6.876.573	107,083	41.54	34 88
1876	6,054.458	7,369,112	106 928	39.56	32.53
1877	6,397.102	7,758.745	109,787	38 44	31.70
1878	6,799,961	8,267,602	111.316	36.67	30 16
1879	6,814,564	8,306,707	113.023	37.15	30.48
1880	7,222.729	8,973,816	123,208	38.24	30.78
1881	7,598,954	9,401.119	134,569	39.67	32.06
1882	7,861,557	9.570,205	130,834	37.27	30.62
1883	7,985.783	9,630,406	132,159	37.07	30.74
1884	8,099,963	9,693,285	127,819	35.35	29.54

Increase per cent. from 1873.

Year.	Train miles.	Engine-miles.	Fuel consumed.	
1874	3 11	4.3	3.8	
1875	7.04	10.8	4.5	*Train-mile.* 43.33 / 37.07 = 16.9 p. ct. saving.
1876	14 38	18.7	4.3	
1877	20 7	24.9	7.1	
1878	28.3	33.2	8.6	
1879	28.6	33.8	10.3	
1880	36.3	44.5	20.3	*Engine miles.* 36.99 / 30 74 = 20.3 p. ct. saving.
1881	43.4	51.4	31.3	
1882	48.4	54 1	27.7	
1883	50.8	55.2	28.7	
1884	52.9	56.2	24.7	

This table makes a very remarkable showing of steady, continuous reduction; the exceptions being unimportant. As is made very clear by the table of percentages which we have added, the growth of train mileage has been remarkably even at about 5 per cent. a year, the increase of switching mileage trifling, and the coal burned, nevertheless, actually falling off in aggregate amount. It is claimed by the *Engineer* that this economy is in good part the result of the substitution of new engines working with heated feed-water for the old engines of miscellaneous types; and this notwithstanding that the trains have increased in weight 40 per cent. during the ten years.

The Midland Railway, a line stated to "combine all manner of adverse conditions" with traffic, is conducted at exceptionally high speed, and much of it over the heaviest roads [meaning, probably, grades and curves] in England, and with "very heavy and luxurious coaches," makes the following showing:

MIDLAND RAILWAY.
Statistics of Locomotive Work, 1873 to 1883.

Year.	Train-miles.	Inc. p. c.	Coal burned p. m.	Dec. p.c.
1873	19,811,396	....	57.18	....
1874	20,834 042	5.1	54 68	4.2
1875	22,515,234	13.6	53,40	8 2
1876	23,651,546	19.4	52.67	8.8
1877	24,738,317	24.9	50.76	14.2
1878	25,621,576	29.4	48 70	14.8
1879	27,097,735	36.8	49 17	14.0
1880	29.558,458	49.2	46 51	18.7
1881	31,583,760	59.3	47.39	17.0
1882	32,062.736	61.9	47.41	17.0
1883	33,087,255	67.1	49.00	14.3

A like extraordinary evenness of growth in train mileage to that noted above appears in this table and an almost equally remarkable decrease in coal burned per mile.

The decrease in coal burned per train-mile on each of the four roads specified above is as follows, the roads being given in order of percentage of saving:

	Miles worked	—Coal burned per train-mile.— 1873.	1883.	Dec. p. c.
Lon., Brighton & So. Coast	435	43.33	37.07	16.9
Midland	1,553	57.18	49.00	14 3
Great West.	2,268 (pass. 29.0 / frt 51 4)	(41.73 / 45.2)	(37.09 / 12.0) (5.1)	9 8
Great East.	965	41 65	45.96	(*Inc.* 10.35)
	5,221	45.97	42.43	7.75

* Including *half* of the joint lines.

The mileage represented, 5,221 miles, is only a trifle less than one-third of the 16,000 miles in Great Britain, and the roads given would appear to be, as claimed by the *Engineer*, in all respects a fair representative of the entire system.

The comparison with American practice which these statistics invite we cannot now enter into with any fullness, but in the meantime we present, as an interesting record showing the tendencies in this country in the direction of locomotive economy, the table in another column, giving a complete history of locomotive management on the Pennsylvania Railroad (so far as exemplified by the items given in the statement) from the beginning of its history. It will be seen that the average consumption of coal per mile by all engines is very much higher than in England and has been in recent years steadily and rapidly *increasing*. The coal burned per *car* mile, however, has remained practically stationary, revealing that the chief cause of the apparent increase lies in the increased power and load of engines. This is still more clearly visible in the following comparative figures of freight traffic only, running as far back as it was possible for us to deduce the desired facts from the statistics that are given in the Pennsylvania reports, which shows what the trains consisted of and the consumption of coal per unit:

Year.	No. cars.	Train load tons fr't per car.	Approx. total w't of tr.; tons.	—Coal burned per mile.— Per ton fr'ght.	Per car-m.le.	Per tr.-mile.
1874	21.1	(6.5)	327	(.640)	4 2	88.5
1875	21.5	(6.7)	...	(.627)	4 2	90.2
1876	22 2	(6 9)	. .	(.609)	4.2	93.1
1877	22.92	(7.1)	....	(.585)	4.15	95.0
1878	25.06	(7.3)	....	(.497)	3.63	91 0
1879	25.60	7.55	436	.490	3 70	116.7
1880	25 77	8.18	....	.477	3.90	112.0
1881	24.40	8.68	....	.492	4.27	109.3
1882	24.55	9.01	....	.494	4.45	104.3
1883	23.97	10.28	...	.454	4.67	100.5
1884	25.66	10.58	566	.430	4.55	99 2

NOTE.—The tons freight per car was obtained by dividing the coal consumption *per car* given by that *per ton;* the approximate total weight by assuming the average car to have weighed 18 000 lbs. (9.0 tons) in 1874, 19,000 lbs. (9.5 tons) in 1879, and 23,000 lbs. (11.5) tons in 1884: the coal burned per train by multiplying the number of cars by the coal per car. The remaining figures are direct from the report.

The figures in parentheses above are estimated, not being given in nor deducible from the reports; but they are not far from the truth, a gradual increase of average car load having, as is well known, been going on even in the years 1874–9, which has gone on much more rapidly since. For the benefit of foreign readers we may note that one of the chief reasons why the average car load has been so small, on all the American east and west trunk lines, has been the enormous disproportion (more than 3 to 1) in east-bound to west-bound traffic. The increasing coal shipments westward, to a considerable extent in cars coming east with grain, has in recent years helped much to decrease this disproportion on some roads; so that the increasing average car-load is not due solely to increased capacity of cars, although that is the chief cause.

In detail, the changes in the average train-load of the Pennsylvania Railroad have been as follows, the paying load

being actual, as computed from the statistics above, and the dead-load estimated, but close to the truth:

Average Freight Train, Pennsylvania Railroad.

	Freight— Tons.	p. c. inc.	Cars — Tons.	p. c. inc.	Total— Tons.	p. c. inc.
1874	137	....	190	....	327	....
1879	193	40.8	243	27.9	436	33.4
1884	271	40.4	295	21.4	566	29.8
Total		97.8		55.3		73.2

From these statements, which are a not unfair presentation of the general tendencieson leading American lines, it appears that the changes of the last five and ten years have been as follows:

	Last 5 years. Per c.	Last 10 years. Per c.
TRAIN-LOAD.		
Number of cars per train	Inc. 0.02	Inc. 24.7
" tons per car	Inc. 40.2	Inc. 63.0
" tons per train—freight	Inc. 40.4	Inc. 97.8
" tons per train—cars	Inc. 21.2	Inc. 55.3
" tons per train—total	Inc. 29.8	Inc. 73.2
COAL PER MILE.		
Per ton-mile (of freight)	Dec. 12.3	Dec. 33.3
" car-mile	Inc. 23.0	Inc. 8.3
" train-mile	Dec. 15.0	Inc. 12.1

This is a showing indicating immense progress in economy. It is economy in quite a different directon from that indicated by the statements and (still more noticeably) omissions in the English tables, but it is beyond doubt a much wiser and more desirable direction; viz: toward an increase in the *work done* per engine and per car rather than in the cost of running them per mile. By increasing the *work done* we not only decrease the cost of fuel and repairs per unit of traffic, but also the cost per unit of many other items not affected at all by a mere saving in fuel.

The Pennsylvania has increased its train-load in 10 years	net	97.8 p. c.
	gross	73.2 p. c.
With an increase in coal per train-mile of		12.1 p. c.
The Great Eastern of England has increased its train-load in 10 years	net	(?)
	gross	10.2 p. c.
With an increase in coal per train-mile of		10.3? p. c.
And all the four roads given above, with an unknown (but, for any facts which appear, inconsiderable) increase in train-load, have decreased their coal consumption		7.75 p. c.

If this economy in coal consumption has been gained by concentrating the attention upon the comparatively trivial end of decreasing the fuel burned per engine instead of increasing the work done per engine, it has been dearly purchased; and American managers may congratulate themselves on the showing they can make in one respect, if not in the other.

In these figures we have not as yet considered passenger traffic, in which the Great Eastern Railway certainly shows a marked increase in the work done per engine; 60.2 per cent. in ten years, as elsewhere noted. It should be remembered that the American passenger train probably averages considerably heavier intons than an average English train; especially of those lines which do a heavy metropolitan and suburban traffic; in addition to the grades and curves being heavier. An *average* train on the Pennsylvania, with an engine and tender weighing some 62½ tons, will weigh in all some 188 tons, whereas the heaviest Great Eastern express, illustrated in another column, weighs only 240.8 tons, and ten years ago weighed only 150.2 tons.

On the other hand, the difference in number of stops per 100 miles of run, if known, might require an important allowance in the other direction, or might not. Mentioning these facts only to show that direct comparison without due allowances is unfair, the following figures give the consumption per mile run of the Pennsylvania passenger engines, which are for the most part of about the same power, and closely correspond in power with the Great Eastern first-class goods engine above described, although somewhat lighter; having 17 × 24 cylinders, 62 to 68-in. drivers, and weighing 71,900 to 78,750 lbs. The table shows the record as far back as the necessary data can be determined from the reports; which, as it happens, is just ten years:

PASSENGER-TRAIN COAL CONSUMPTION, PENNSYLVANIA RAILROAD.

YEAR.	Cars per train.	COAL PER MILE. Per car.	Total.
1874	5.5	9.0	49.5
1875	5.3	8.5	45.1
1876	5.6	8.3	46.5
1877	5.10	8.72	44.5
1878	5.13	8.43	43.2
1879	5.29	8.40	44.4
1880	5 27	8 76	46.2
1881	5 01	10.78	54.0
1882	5.14	9.61	49.4
1883	4.95	10.84	53.7
1884	5.02	10.07	53.6

NOTE.—The last column is not given in the reports, but is obtained by multiplying together the two preceding columns.

The increase of 18½ per cent. in the coal burned per car notable in this table is undoubtedly the price paid for the very much greater average weight of passenger coaches, owing to the increasing proportion of parlor and sleeping-car mileage, and the much greater average speed. Whether or not it is fair, under all the circumstances, to compare the performance of the Pennsylvania passenger engines with the average of both passenger and freight engines on the above English roads is a matter of opinion. It strikes us that, in a rough way, it is; or at least, is fairer than to compare passenger with passenger and freight with freight without some important allowances.

The Pennsylvania has been selected merely because its statistics are most conveniently accessible. It is in no respect pre-eminent either in increase of train-load or in low fuel consumption. The movement toward increase of train-load began on the Lake Shore & Michigan Southern, for example, several years before it began on the Pennsylvania, and would, we apprehend, show a more remarkable percentage of increase. As respects economy of fuel, the coal burned by the Philadelphia & Reading passenger engines per mile did not vary over 0.1 ton from 2.4 tons (2,240 lbs.) per trip of 93 miles for a long series of years ending with 1878, when they ceased to make the report from which the fact can be derived. This amounts to 57.8 lbs. per mile run, which is only moderately in excess of the Pennsylvania, while the average train would appear to have been much heavier than on the Pennsylvania.

Single instances in great numbers, or averages of small roads and of a few engines, showing better performances than any of the roads above specified, English or American, may be obtained by a little search. Thus in some figures which Mr. J. N. Lauder recently furnished us of some tests of the effect of a brick arch in a high-speed passenger engine (probably 17 × 24), the consumption was:

With plain fire-box	39.3 lbs. per mile run.
With brick arch in fire-box	34.3 " " "

Showing a difference of 14 per cent. in favor of the brick arch and a very low fuel consumption either with or without it. Mr. Lauder also informs us that his 17 × 24 engines in Northern Mexico averaged just about these figures for two years. Such exceptions, however, merely prove the rule, that the consumption of American passenger engines is over 40 lbs. per train-mile, and when the trains are heavy and fast, from 45 to 55 or even 60 lbs.; but even granting this, it would appear probable that the difference between English and American practice is for the most part an easily explicable percentage, after allowing for difference in work done, and not nearly so great as is often assumed from comparisons of partial statistics. We imagine that the two chief causes of the remnant of difference against us, which beyond much doubt exists after making all proper allowances, are (1) the greater skill and experience of English firemen and (2) the severity of our winters, which should do more harm than our hotter summers do good; but the facts presented are not sufficient to warrant any positive conclusions in this respect.

Whistling.

The excessive use of the locomotive whistle on some railroads in populous localities is not only a great annoyance to many people, but is often a serious injury to the sick. Some enginemen seem to have a reckless desire to make all the noise they can, and to prolong the blast beyond endurance, sometimes regardless of the rules of the road or of a proper observance of them, and sometimes with the tacit or expressed approval of their superiors. Although the whistle is doubtless essential for some purposes in the operation of railroads, there is no doubt that it is used a great deal more than is necessary. When the crossings are frequent and protected by gates, the keepers of which are notified of the approach of a train by electric signals, the use of the whistle in passing is unnecessary, and ought to be abolished. So the signal of approach to a station is often unreasonably pro longed, and where the coming train is announced by electric signals it is superfluous.

In Massachusetts in 1872 and 1874, upon numerous complaints as to the excessive use of the locomotive whistle on some of the roads in and near Boston, the Railroad Commissioners gave considerable attention to the subject, and heard the testimony of many persons concerning the annoyance they experienced, and of several physicians as to the serious and sometimes very dangerous effects of the sudden and terrific noise upon the sick. The State Board of Health also, at the request of the Commissioners, obtained by circulars to medical men in all the cities and large towns their opinion of the bad effect of the whistle upon the sick near the line of a railroad. The Commissioners accordingly reported at some length on the subject, and recommended that the use of the whistle, except in cases of actual necessity and as a signal of evident danger, be discontinued on the railroads in Boston and in other populous neighborhoods. Most of the companies conformed to this recommendation to a greater or less extent, and the people who had experienced the greatest annoyance were greatly relieved. But after a year or two, through changes of employés, or perhaps of management, there was on some roads a gradual relapse into the old practice, and complaints were made from time to time of local annoyances which the Commissioners tried to remove or modify by specific recommendations. The multiplication of trains, especially of express trains—from which always came the most terrific blasts—increased the annoyance at other places besides Boston and its suburbs, and finally the matter reached the Legislature. At its last session a law was passed authorizing the Railroad Commissioners, on petition and after a hearing, to prohibit or regulate the sounding of whisties of locomotives at any specified grade crossings. Some of the residents of Lawrence availed themselves of this act, and asked the Commissioners to prohibit whistling on the Boston & Maine and the Boston & Lowell railroads at all the street crossings within a radius of about a mile from a certain point. After a hearing, at which the railroad managers did not oppose the petition, the Commissioners issued an order prohibiting the warning whistle at the crossings of a number of streets named. This took effect several weeks ago, and the residents in the neighborhood say they are greatly relieved, although there is necessarily still some use of the whistle for other purposes. This result will probably lead the people of other localities to seek like relief.

One reason why the whistle has been persistently and excessively used on some roads as a crossing signal is because the courts have held railroad companies not only to a strict observance of the requirements of law as to grade crossings, but to the use of other precautions to warn the traveler on the highway. Such rulings were made in cases of accident at crossings unprotected by gates or flagmen, and where there is no such protection the whistle may be needed. In such cases it is hardly to be supposed that the Massachusetts Commissioners would prohibit the use of the whistle. But when the crossings are protected by gates and gatemen who are duly warned of the approach of a train by electric signals, there is no necessity and no excuse for using the whistle to annoy and injure a large number of people residing in the neighborhood.

Moreover, there are whistles and whistles. Apparently the pattern on some roads was selected because it produced the most ear-torturing sound so far discovered. But the scolding of a locomotive is just as effective if delivered in a milder tone, and there are whistles which are quite endurable. No one is justified in causing the needless torment which some locomotive whistles give, and their use ought to be stopped entirely.

It was reported in Chicago Saturday that contracts were made to carry a large amount of flour to New York by propeller to Buffalo and thence by rail at 8 cents per 100 lbs., and there was a rumor that wheat was taken through by rail at 9 cents. The latter is at the rate of about $\frac{3}{16}$ cent (0.1875 cent) per ton per mile. At this rate, a year's supply of flour for the average person is brought from Chicago to New York for the wages of a common laborer for an hour and a half. It is such rates as these that are equalizing the price of farm land in Dakota and England. The lake vessels feel the railroad competition more in a paucity of shipments than in reduced rates. They receive what has been a common midsummer rate for several years—1½ cents a bushel for corn and 1⅞ for wheat—for what little they get to carry; but neither they nor the railroads get much. Some of them are preparing to lay up for the season. In the other direction they get 50 to 55 cents per ton for coal to Chicago and 5 cents less to Lake Superior ports, which receive so little that there is more competition for it by the vessels going up for cargoes of wheat and flour.

Canal rates are 3⅛ cents per bushel for corn and 3⅜ for wheat from Buffalo to New York, and at these rates the canal has been able to get the traffic. The Buffalo grain shipments by rail and canal for five weeks have been:

	Aug. 1.	Aug. 8.	Aug. 15.	Aug. 22.	Aug. 29.
By rail	304,002	124,140	287,518	174,454	459,238
By canal	910,909	1,244,639	1,233,410	1,816,176	1,238,040

The lowest rail rates have been made since Aug. 29, and these may have had a greater effect than is shown above on the amount of rail shipments, which have been unimportant.

Chicago through rail shipments eastward for the week ending Sept. 5, including only grain, flour and provisions this year and last, and but freights of all kinds in previous years, have been, in tons:

1880	1881	1882	1883	1884	1885
39,051	63,144	38,106	46,947	27,285	35,022

Thus the shipments this year were 28 per cent. more than last year, and allowing for freight not included this year, probably rather more than in 1880 and 1882, and less than in 1881 and 1883.

For six successive weeks the total shipments and the percentage going by each railroad have been:

	Week ending.— Aug. 1.	Aug. 8.	Aug. 15.	Aug. 22.	Aug. 29.	Sept. 5.
Tons:						
Flour	2,134	2,609	1,826	2,077	2,592	2,182
Grain	7,528	15,773	10,737	20,881	20,870	22,835
Provisions	7,828	7,729	8,147	10,341	7,840	10,005
Total	17,490	26,111	20,710	33,299	31,302	35,022
Per cent.:						
C. & Grand T.	15.1	12.4	10.0	12.4	17.1	8.1
Mich. Cen.	8.2	32.7	23.8	18.5	13.3	19.2
Lake Shore	11.8	9.7	7.1	13.5	10.9	19.7
Nickel Plate	10.4	8.6	13.8	18.0	16.2	9.7
Ft. Wayne	23.7	16.8	15.4	14.1	13.3	14.9
C., St. L. & P.	13.1	9.6	12.5	8.3	7.9	9.5
Balt. & Ohio	9.2	5.9	7.3	6.3	8.6	6.1
Ch. & Atlantic	8.5	4.3	10.1	8.9	12.7	12.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

The total shipments last week were the largest for nine weeks, and 12 per cent. more than the previous week; the increase was 9½ per cent. in grain and 27½ per cent. in provisions; but there was a decrease of 16 per cent. in flour, the total shipments of which were not much greater than a single cargo shipped from Duluth last week. The provision shipments would be large at any season of the year.

Compared with the previous week, there are some great changes in the percentages of the different roads, the Chicago & Grand Trunk's not being half as great, and the Nickel Plate's falling off nearly as much, while the Michigan Central's was greater by nearly half and the Lake Shore's by four-fifths, the Pennsylvania roads also gaining somewhat. The two latter together carried 24.4 per cent. of the whole last week; the three Vanderbilt roads 48.6. For the six weeks their percentages have been:

Vanderbilt	30.4	51.0	44.7	50 0	40.4	48.6
Penna	36.8	26.4	27 9	22.4	21.2	24.4

The percentages generally were more nearly normal last week than the week before, perhaps because all the roads had come down to the basis of the lowest cut rates made by a few the week before. Grain was taken at 10 cents per 100 lbs. in some cases, it is said. The two Pennsylvania roads carried 46⅞ per cent. of the provisions; the Lake Shore 18⅞ and the Grand Trunk 13⅝, leaving but 20⅝ for the other four roads. The Nickel Plate, which the week before stood first in grain shipments (taking 4,439 tons and 21.3 per cent. of the whole) last week stood fourth, with 2,981 tons (13 per cent).

This is the time of year when the Chicago shipments usually become larger. They have grown (since the midsummer weeks) quite as much as usual, but the rates are so unprofita-

ble that it is not of advantage to the roads that the traffic should be large.

The wheat receipts at the Northwestern markets have decreased since the second week of August, when they reached the maximum for this year. The places which receive winter wheat chiefly show a decided decrease, while as yet there is no increase at the spring-wheat markets. Detroit is keeping up best, in the week to Aug. 29 receiving more than Chicago, Milwaukee and Duluth together, and only 70,000 bushels less than St. Louis, which stood first. The course of receipts at the leading Northwestern markets for seven weeks has been :

Week to	Chicago.	Toledo.	Detroit.	St. Louis.	Total.
July 18	284,204	32,080	28,066	161,907	882,009
" 25	264,311	70,913	45,785	318,837	1,133,400
Aug. 1	215,508	258,556	98,919	373,900	1,379,572
" 8	201,631	376,588	229,261	263,626	1,246,486
" 15	231,098	540,820	303,382	638,969	2,045,412
" 22	202,479	362,731	427,852	590,082	1,748,958
" 29	209,163	266,274	409,458	479,427	1,573,675

Thus the three winter-wheat markets received in successive weeks :

Week to-						
July 18.	July 25.	Aug. 1	Aug. 8.	Aug. 15.	Aug. 22.	Aug. 29.
222,113	435,535	731,375	869,475	1,483,171	1,380,465	1,155,159

Thus Toledo in the fourth week of August received but half as much as in the second week, and St. Louis received one-fourth less, Detroit receiving one-third more, and the total wheat receipts of the eight Northwestern markets falling off nearly one-fourth.

When the spring wheat comes forward, which it should begin to do this month, receipts should become larger than at any time heretofore, but the increase will probably be almost entirely at Duluth, Milwaukee and Chicago.

While wheat receipts have decreased at the Northwestern markets, they have increased at the Atlantic ports, and in the fourth week of August were larger than in any previous week of this year, and indeed the largest since the second week of November last year. The wheat receipts have fallen off at every point except New York, where in the last week of August they were larger than in any other two weeks since the middle of June, and larger than in any other week since last October, and exceeded in but four weeks after the great wheat harvest of 1884. Philadelphia and Baltimore receipts culminated in the last week of July. The course of wheat receipts at the principal Atlantic ports, and the total receipts of the eight ports for eight weeks have been, in bushels:

Week to	New York.	Montreal.	Phila.	Baltimore.	Total
July 11	281,850	76,127	29,400	144,142	570,899
" 18	528,480	129,043	55,800	332,267	1,059,148
" 25	289,610	199,394	96,000	435,400	1,05 ,373
Aug. 1	435,115	163,959	165,000	429,423	1,221,798
" 8	429,651	128,467	91,400	368,385	1,045,985
" 15	737,076	170,875	83,800	278,849	1,334,340
" 22	804,907	157,462	72,000	244,663	1,321,780
" 29	1,568,415	40,260	36,000	226,601	1,913,882

The Philadelphia receipts are insignificant and have not been important at any time this season. Baltimore received one-half more than New York in the week to July 25, while New York received nearly seven times as much as Baltimore in the week to Aug. 29. In spite of the low rail rates, most of the grain goes by canal, which gives New York the advantage.

The corn receipts of the Northwestern markets became large in the last half of August, having been disappointingly small previously this summer. In the fourth week of August the corn receipts were larger than in any previous week since April 11, yet a million bushels less than in the corresponding week of 1883. The increase in receipts is encouraging, and there is a fair prospect that the fall receipts will be unusually large. Unlike wheat, there is no large stock of corn in store at the markets, either east or west, and what comes to the Northwestern markets goes forward almost immediately. Nearly half of the entire "visible supply" reported Aug. 29 was in transit, and the total stock east of the lakes was less than one week's receipts at the Northwestern markets.

The Great Northern Railway Company, of England, has about 800 horses in London, and carts 1,200 to 1,800 tons of freight daily to and from its stations. In London freight is delivered for the most part directly from the cars to carts—not always to the company's carts, however, as large establishments, which receive quantities of freight daily, often do their own carting; but they have their carts on hand when freight trains arrive (usually early in the day in London), so that they may receive directly from the cars, the goods being in most cases picked up from the open cars by cranes standing on the platform and swung over the platform to the cart. This prompt delivery is encouraged by very high charges for storage. In this way a railroad handles an enormous traffic in London on a very small space of ground. A separate charge is made for carting, which is sometimes, and formerly was generally, done by contract by firms or companies specially engaged in that business.

There have been in France of late years numerous light local railroads intended to serve districts where the traffic will not support an ordinary railroad, and which have light trains and low speed, many being of the metre gauge. A recent study of the results of the working of these lines names 42 of them, with an aggregate length of 1,013 miles. The average cost of these "cheap" railroads was $44,310 per mile, their gross earnings in 1884 were $1,976 per mile, the working expenses $1,674, and the net earnings only $302 per mile, which is only 0.7 of 1 per cent. on the cost! The cheapest of these roads have usually cost more than $25,000 per mile. Elsewhere in Europe light railroads are built for less than $16,000 per mile, and when (as is often the case) the turnpike is used as a road-bed, they seldom cost more than $8,000 per mile.

In Germany the average cost of 12 similar ("secondary") railroads, measuring 342 miles in the aggregate, was $26,678 per mile, and their net earnings were at the average rate of $1,068 per mile, which is about 4 per cent. on the cost.

In the *Railroad Gazette* of June 12-19, 1885, we discussed the nature of "Bad Wheels and Bad Wheel-Makers," as revealed in some statistical data (compiled for this journal from original records), which we hope produced more effect than we expect. Among the conclusions drawn was this, as to the effect of quality of wheel on sharp flanges :

"A strong side light is also thrown (by the figures given) upon the question of sharp flanges and the causes thereof. Whatever may be the chief cause of that phenomenon, we have evidence here which, as regards this particular 300,000 wheels, may be called decisive; that one important cause was intimately connected with the quality of the wheel itself. For these particular wheels all suffered alike from the evil effects of the same sharp-cornered pattern of rail, and were, as nearly as may be, equally exposed to all other possible and impossible causes of sharp flanges *except* differences in their own quality. * * * This will bear summarizing more fully, in a little different form :

"Out of **1,000** wheels *removed* there were :

In 1,000 wheels made by the
- Six best makers, 27 sharp flanges.
- Six next best makers, 82 sharp flanges (3 times as many).
- Twelve worst makers, 124 sharp flanges (4.6 times as many).

"Out of **10,000** wheels *in service* there were removed for sharp flanges :

In 10,000 wheels made by the
- Six best makers, 12 wheels.
- Six next best makers, 89 wheels (**7.4** times as many).
- Twelve worst makers, 250 wheels (**20.8** times as many).

"This leads to the striking conclusion, to the extent that one year's removals from 300,000 wheels by 24 different makers can give trustworthy evidence, that the same differences of quality *have nearly twice as great effect upon the number of sharp flanges as upon the number cracked and broken*, as thus :

Relative Increase in Number of Wheels Cracked and Broken and in Number of Sharp Flanges caused by difference of quality.

Comparison by percentages of wheels *removed*.

		Broken only.	Cracked and broken.	Sharp flanges
Six best makers	Standard of comparison.	1.00	1.00	1 00
Six next best makers		1.10	1.80	3.04
Twelve worst "		2.20	2.80	4.60

Comparison by percentages of wheels *in service*.

Six best makers	Standard of comparison.	1.00	1.00	1.00
Six next best makers		2.56	4.50	7.42
Twelve worst "		9.78	13.28	20.83

"We have seen nothing heretofore affording such positive and direct indications that flange-wear is immensely affected by the quality of the wheel, especially if taken in connection with the individual record."

There is no possible ambiguity in the words in which it is here distinctly stated, in several places, that the comparison made is between an equal number of wheels of different *qualities*, and not in any sense between individuals makers; nor between makers at all, excepting as birds of a feather are averaged together to find out what the average is. Yet an alleged technical journal, which those who may have chanced to see it may guess the name of, after appropriating (without credit) a portion of the data which we gave, plays the mountebank with figures in the following fashion; amusing for the ignorance displayed, but not justifying serious comment: We omit the buffoonery by which the figures are surrounded :

[Out of 1,000 wheels removed for all causes]: "27 sharp flanges among the six best makers is an average of 4.5 wheels per maker; and 124 sharp flanges among the twelve worst makers is 10.33 wheels per maker, or only 10.33 ÷ 4.5 = 2.3 times as many [instead of 4.6, as above.—Editor].

"Out of 10,000 wheels *in service* * * * removed for sharp flanges, we make 12 ÷ 6 = 2 wheels per maker, among the six best makers, and 250 ÷ 12 = 20.833 per maker among the worst makers, or nearly 20.833 ÷ 2 = 10.416 times as many, instead of 20.8 times, as claimed by the *Gazette*."

Record of New Railroad Construction.

Information of the laying of track on new railroads in the current year is given in the present number of the *Railroad Gazette* as follows :

Chicago, Burlington & Quincy.—A branch of the *Burlington & Missouri River* line is completed from Holdrege, Neb., west by north to Elwood, 29 miles.

Evansville, Washington & Brazil.—Extended from Plainville, Ind., north to Owl Prairie, 4 miles.

Greenwood, Laurens & Spartanburg.—Extended from Woodruff, S. C., northward to Spartanburg, 23 miles.

San Antonio & Aransas Pass.—Track laid from San Antonio, Tex., southeast 7 miles.

This is a total of 63 miles on 4 roads, making 1,627 miles thus far reported for the current year. The new track reported to the corresponding date for 14 years past has been :

	Miles		Miles.
1885	1,627	1878	1,273
1884	2,384	1877	1,223
1883	3,584	1876	1,556
1882	6,940	1875	746
1881	4,235	1874	1,022
1880	3,288	1873	2,507
1879	1,863	1872	4,623

This statement covers *main track only*, second or other additional tracks and sidings not being included.

NEW PUBLICATIONS.

Pocket-Book of Mechanics. By John W. Nystrom, C. E. Eighteenth edition, revised and enlarged.

Mr. Nystrom's work is over; and, although his revised pocket-book is still far from being all that might be desired, we shall all be fortunate if we leave behind us as good an excuse for our existence as he in this now well-known volume. It has grown since the last edition to 672 pages, 200 new pages, with a corresponding increase in tables and engravings, having been added. The first edition appeared in 1854, or some nine years after the first publication of "Haswell," the two being in some sense rivals, and hence naturally inviting comparisons. To a considerable extent also it covers the same field as Trautwine, although it differs from the latter much more radically.

It is unnecessary to enter into invidious comparisons, however, for all these books have merits peculiarly their own and all are likely to be useful to those regularly engaged in mechanical and engineering works. It must in candor be added that Nystrom and Haswell have also, to a considerable extent, the same great fault; that matter which has once got in has been over apt to stay, so that both of them are to some extent a museum of technical antiquities; a disadvantage to the reader who feels obliged to *rely* on them for his information out of all proportion greater than to those competent to weigh what is given on its merits. To see the gauge of the "Camden & Amboy" put down as "4 ft. 10 in." strikes one, at this late day, as a little funny. The most cursory revision should correct such matters.

This fault, however, is hardly more than a minor one in Nystrom, as is also the presentation of certain individual reformatory notions, like "a new system of arithmetic," based on a unit of 12 instead of 10, with two new primary digits added! Not but that every one will admit that, had the human race chanced to have six fingers and thumbs on each hand instead of five, so as to start in with that sytem, it would have been abstractly a better unit, but it is so hopelessly impracticable as a present question—many times more hopeless than a change to the metric system—that even a page of space in a pocket-book is wasted in presenting it.

It is pleasanter, and in this case fairer, to dwell upon the merits of the volume. The primary one, that space is not wasted in writing out simple algebraic formulæ in words and that the problem to which they apply is, wherever possible, stated in a small cut without words, which has existed from the first in Nystrom, is still preserved. The advantage in clearness and conciseness is great to any one who is able, not necessarily to use algebra, but simply to translate an algebraic formula into words. The best tables for converting metric into English measures that we know of occupy 13 pages of the new edition, and all the allied data on weights and measures, algebra, geometry and trigonometry are in better shape than in any other pocket-book known to us. The same is true in part of the data on strength of materials and elementary statics and mechanics. Gearing, shafting, belting, heat, steam, steam engine, boilers, valve gear, chimneys, ship-builiding, etc., etc., are headings, all of which cover much tabular and other matter, a large part of which is new. The typographical style of the book is better than that of either of the other leading pocket-books, and the judgment shown in selecting as well as arranging the matter (the value of a large part of which does not change with time) ought to make it useful to every one having much use for pocket-books of any kind.

TRADE CATALOGUES.

Illustrated Catalogue of Machine Tools. E. Gould & Eberhardt, Newark, N. J.

This catalogue truly says that most of the machines shown are from newly designed patterns. The firm has not been one of those who confine themselves wholly or mainly to manufacturing old designs, but has introduced several new tools, which, we believe, are generally admitted to contain features of marked interest. Two of these, a new automatic feed upright drill and a swing engine lathe, we have recently illustrated.* Others shown in this catalogue are of perhaps equally meritorious, if less novel, design. Typographically, the catalogue is very neatly prepared, although the practice of using pale brown or blue printing inks for such publications is being carried so far that printers will soon have to return to black ink for novelty.

Foreign Technical Notes.

The average proportion of time on duty to time off on German Railroads is given by the following table, which seems to include Sundays as well as week-days :

Nature of Service.	Locomotive Hands.			Train Hands.		
	On duty.	Off duty.	Proportion.	On duty.	Off duty.	Proportion.
Passenger	43 p. c.	57 p. c.	3:4	47 p. c.	53 p. c.	8:9
Freight	45 p. c.	55 p. c.	5:6	44 p. c.	56 p. c.	4:5
Switching	50 p. c.	50 p. c.	1:1	50 p. c.	50 p. c.	1:1

The court before whom the telegraph operator at Hanau, in Prussia, was tried for letting a train come on from the next station before the track was clear, thus causing the serious accident near that station last November, sentenced the operator to three years' imprisonment; but nothing was done about the contributory negligence that caused the accident. The trial was conducted in such a way that the witnesses were under some pressure not to inculpate the higher officials, and although the operator was certainly guilty of the offense alleged, it is equally certain that the accident would not have occurred had reasonable precautions been taken in the matter of continuous brakes, properly arranged distance signals, and sending out a flag from the standing train. It also appeared on trial that various precautions in the neighborhood of the station had been pointed out for years by various officials, but nothing was done until the accident demonstrated effectually their necessity, when the officials very properly, but unfortunately for their own repute, set about them at once.

The leading Frankfort paper says : "The whole country, and particularly the traveling public, has the fullest right to

* *Railroad Gazette*, June 12 and July 17, 1885.

demand that the state railroad management shall do at least as much for the safety of the traffic as the former private owners." This seems a fair claim enough, in view of the fact that safety and cheapness for the public are supposed to be the leading advantages of state direction.

German experience gives preference to stay-bolts over bars for top of fire-box, where the tube-sheet ring is of well rounded form and the first row of bolts is put in as far as practicable from the tube-sheet. The preference is chiefly on account of greater ease in keeping fire-box tops clean. It is recommended that the first row of bolts from tube-sheet should be removable.

It also decidedly favors copper for fire-boxes, and gives following specification for the material for that purpose :

1. To have a smooth surface without cracks, bubbles, or scales and to be homogeneous, best refined material, free from foreign matters.

2. The plates must admit of being bent, either hot or cold, to such form as required without showing cracks or scales. Bars half an inch wide cut out of the same, and with the corners rounded off, must allow of folding together hot or cold through 180° without showing cracks.

3. Tension test with pieces cut off in the direction of rolling should reach at least the following figures : Extension between marks, 200 *mm.* (8 in.) apart, 35 per cent.; tensile strength, 31,000 lbs.; percentage of area of rupture to original area, 40 per cent.

4. The surface of rupture to appear fine grained and bright, with the peculiar pale red of good copper.

Various methods of treating corroded boiler plates by lackers of various metals have been tried on German roads, without as yet definite results as to preventing further corrosion.

For smoke-box tube-sheets favorable experience has been had with copper in spite of its high price, in avoiding corrosion..

Tar has been used for painting the inside of tender tanks, and some roads have tried it successfully on the inside of boilers, which seems remarkable.

The great majority of German master mechanics decidedly favor bushings for connecting and coupling rods, instead of strap ends. Red brass and phosphor-bronze is used for these, and when worn they are lined with white metal. Advantages claimed are greater simplicity of construction, greater security in keeping the correct length of rods between pin centres; rarer heating, greater durability, and easier and cheaper maintenance—a formidable list, with some rather unexpected items.

Statistics of Locomotive Service on the Pennsylvania Railroad, 1851 to 1884.

	No. Loco's.	Per cent. in shop.	P. c. of standard patterns.	Mileage (millions and decimals). Pass.	Fr't.	Total.	Lbs. coal per mile.	Cost per mile run. Repairs.	Fuel.	Total.	Miles run per engine. Pass.	Fr't.	Lbs. coal, car-mile. Pass.	Fr't.
1851	26	.....	.....	.....	.....	0.48	.....	3.5	9.1	.....	.....	.....	.....	.....
1852	43	.....	.....	.....	.....	0.69	.....	4.92	9.1	.....	.....	.....	.....	.....
1853	79	19.0	.....	0.44	0.55	1.00	.....	7.05	9.6	.....	15.2	10 1	.....	.....
1854	115	16.5	.....	0.57	0.92	1.49	.....	12.6	8.8	.....	15.1	10.5	.....	.....
1855	118	13.6	.....	0 68	1.18	1.86	.....	7.25	7.25	.....	20.0	13.6	.....	.....
Average	104.0	16.4	.....	0.563	0.883	1.416	.....	7.064	8.77	.....	17.4	11.4	.....	.....
1856	133	24 8	.....	0 65	1.38	2.02	.....	9.35	8.2	.....	16.6	14.7	.....	.....
1857	216	18.0	.....	0.80	1.74	2.54	.....	8.65	8.60	.....	15.0	11.3	.....	.....
1858	209	20.1	.....	0 98	2.21	3.19	.....	8.25	7.70	.....	20.4	13.9	.....	.....
1859	205	16.6	.....	1.03	2.10	3 29	.....	7.34	7.59	.....	20.6	15.9	.....	.....
1860	208	16 3	.....	1.06	2.42	3.63	.....	7.69	7.17	.....	22.9	18.3	.....	.....
Average	194.2	19.16	.....	0.904	1.970	2.934	.....	8.256	7.852	.....	19.1	14.8	.....	.....
1861	229	28.0	.....	1.12	3.15	4.41	.....	7.81	6.41	15 18	23.8	19.3	.....	.....
1862	255	27.0	.....	1.16	3.74	5.09	.....	7.76	5.98	14.76	23.2	19.7	.....	.....
1863	290	22 0	.....	1.26	4.07	5.54	55.0	9.17	7.07	18.16	22.9	20.2	.....	.....
1864	321	24.0	.....	1.37	4.58	6 01	60.0	14.41	9.19	26 47	20.8	19.1	.....	.....
1835	352	22.7	.....	1 62	4.72	6 60	65.0	11.62	9.19	24.35	21.9	20.2	.....	.....
Average	289.4	24.74	.....	1.306	4.012	5.530	60.0	10.154	7.568	19.784	22.5	19.7	.....	.....
1866	362	22.4	.....	1.78	5.30	7.35	66.5	12 21	8.80	23.48	25.4	23.0	.....	.....
1867	415	20.2	.....	1.92	5.82	8.03	67.0	13.75	8.19	23.70	22.5	21.1	.....	.....
1868	434	21.1	.....	2.05	6.34	8.69	64 8	12.08	7.35	20.99	23.6	20.3	.....	.....
1869	477	15.7	.....	2.30	6.90	9.57	62.9	11.00	7.29	19.49	24.8	21.1	.....	.....
1870	482	14 2	.....	2.47	7.33	10.19	63.6	9.13	6.35	16.28	26.9	22.1	.....	.....
Average	434.0	18.72	.....	2.104	6 344	8.766	64.96	11.634	7.614	20.788	24.64	21.52	.....	.....
1871	514	17.0	.....	2.60	8.88	11.99	68.9	6.81	6.01	13.66	25.5	22.8	.....	.....
1872	554	12.6	.....	2.91	10.84	13.92	72.0	8.16	6.33	15.30	28 2	22.3	.....	.....
1873	662	15.5	.....	3 06	12.44	16.11	74.5	4.90	7.19	12.94	23.7	24.6	.....	.....
1874	654	16 8	60.3	2.93	11.26	14.64	72.2	5.30	6.37	12.43	28.7	22.5	9.0	4.2
1875	655	16.0	65	3.19	11.72	15.27	71.9	5.86	5.11	11.76	27.0	23.0	8.5	4.2
Average	607.8	15 58	.....	2.938	11.028	14.368	71.90	6.236	6.202	13.218	26.62	23.04	8.75	4.2
1876	659	16.4	68.2	4.01	12.32	16.80	74.1	5.87	5.06	11.71	32.4	25 6	8.3	4.2
1877	674	24.2	59	3.55	10.91	14.89	73 8	5.43	4.42	10.56	28.5	22.0	8.79	4.15
1878	648	18.7	62.7	3.62	11.22	15.24	71.5	4.66	4 28	9 50	30.7	24.7	8.43	3.63
1879	643	21.8	64 7	3 76	12.57	16.74	75 1	5.00	4 30	9.79	32.7	27.8	8.40	3.70
1880	627	12.5	84.4	4.27	12 51	17.24	77.9	7.29	5.14	13.00	33.5	27.0	8 76	3 90
Average	650.2	18.72	.....	3.842	11.906	16.182	74 48	5.650	4.64	10.912	31.56	25.42	8.52	3.916
1881	640	12.2	(Nearly all.)	4.68	14.41	19.63	80.6	5.97	5.11	11.74	33.6	28.3	9.61	4.27
1882	693	10.7		5.10	15.24	21.00	82 8	6.50	5.39	12 73	32 8	26 0	10.78	4.45
1883	780	16.7		5.46	15.86	22.11	83.9	7.13	4.99	12.93	34.7	25.7	10.84	4 57
1884	797	19.2		5.78	15.02	21.49	85.7	6.97	5.09	12.77	33.6	25.2	10.67	4.55

NOTES.—A small mileage was made during construction, 220,000 miles in 1849 being the earliest report, which is omitted. The Altoona shops were opened in 1852. There were then 2 eight-driver engines, weighing 43,0 0 and 51,000 lbs., all on drivers, and 7 six-driver engines weighing 57,000 lbs., with 42,000 on drivers. The remaining 34 engines, which were in service through the year, weighed for the most part 45,000 to 47,000 lbs., with 25,400 to 27,450 lbs. on drivers

Running of engines first in, first out, first introduced over whole line in 1878.

The number of locomotives leased to other lines is deducted from the number given, whenever there were any such.

THE SCRAP HEAP.

Train Accident Report—A Correction.

Mr. Theodore S. Mumford, Manager of the Mauch Chunk Summit Hill & Switchback Railroad, writes us as follows:

"In your train accidents for July, I wish to make this correction. There were no passengers fatally injured on this road; four received cuts and bruises from which they have fully recovered at this writing, several slightly bruised and scratched but nothing of any account. Although the road has been in operation since 1827, this was the first accident where passengers were injured."

Fast Time.

When President Sloan, of the Lackawanna, travels over that line, he believes the proper way to study the condition of the road-bed is to run at a high rate of speed. His trip to this city on his way to Niagara Falls yesterday was no exception to the rule. President Sloan and his family left New York at 10 o'clock yesterday morning, and traveled at an ordinary rate of speed as far as Binghamton, picking up General Superintendent Hallstead, Andrew Reasoner, Superintendent of the Morris & Essex Division, and Frank A. Seabert, Assistant Superintendent of the Buffalo Division, on the way. The train consisted of an engine, baggage car, dining car, and Mr. Sloan's private car, the "Oswego." The party arrived at Binghamton at 2:55 p. m., and at 3:02 p. m. the signal was given for the start over the Buffalo Division. The time of passage at the different stations was as follows :

Station.	Miles.	Hour.
Left Binghamton	00	3.02 p. m.
Left Oswego	20.68	3 24 "
Left Waverly	39.10	3.42½ "
Left Elmira	57.00	4.02 "
Left Corning	72.82	4.22 "
Left Bath	93.60	4.45 "
Left Mount Morris	140.63	5.41 "
Arrived East Buffalo	197 38	6.41 "

This leaves the time for the 197.38 miles the remarkably short time of 219 minutes. In the run three stops were made for water and oiling, by which 13 minutes were consumed, and six stops were made for railroad crossings, which, at the company's allowance of 1½ minutes for each, make 9 minutes, a total of 22 minutes lost for stops, leaving the actual running time for the entire distance 197 minutes. This shows conclusively the remarkably fine condition in which the Lackawanna keeps both its road-bed and rolling stock.

The party came into the city over the Lake Shore tracks and were at once taken to Niagara Falls over the New York Central.—*Buffalo Express, Sept.* 5.

Some Railroad Reminiscences.

In the Union Passenger Depot, that Mecca of newspaper men, a party of railroaders were discussing, yesterday morning, the wonderful improvements that have been made upon southern railroads within the recent past. Said an old employé of the Central Railroad:

"I can remember when a passenger train was almost as troublesome to manage as an ox cart on a hilly road. I was one of the first engineers that took a train over the State road. The engine was about the size of an ordinary stationary farm engine, and the cars were almost as small as those used on narrow-gauge roads. There were no brakes in those days. When the train drew near a station, speed was gradually reduced, and when the station was reached, train hands armed with blocks of wood would jump off and chock the wheels."

"Talking of small cars," said a gray-headed old fellow with a hammer in his hand, "in the early days of the Central Railroad the freight cars were not much larger than big dry-goods boxes. Down on the Eatonton Branch, alongside of the track, some of those identical cars may be seen. They have been converted into huts and are occupied by negroes."

"The early railroads had one advantage over those of today," said the first speaker. "While accidents frequently occurred, they were not so destructive to life and property as they are now. The worst accidents in the early history of railroads were caused by what were sometimes called sawyers. The rails would sometimes become loosened where they were joined together, and would curve upward. When one of those curved ends slipped over the top of the wheels of a passing train a dreadful accident was sure to result. I remember that such an accident once occurred to a train my engine was pulling when I was employed on the State road. The rail punched its way through the floor of the rear coach, ripped up planks and seats, and killed or wounded every passenger on board. That accident occurred near Cartersville. The scene, after the accident, was the most sickening I ever beheld."

Transfer Clerk J. W. Harris, of the United States mail service, who was sitting on a mail truck listening to the conversation, got up, struck a base-ball attitude and remarked :

"Railroad accidents are frequent nowadays and they are generally very destructive to property, but not many lives are lost in them. Take this as a pointer:

"In 1882, I ran on the Western Railroad of Alabama as a postal clerk. Going down to Montgomery one day, about two miles north of Chehaw I was sitting in my car with my feet up against a window. I heard a rattling noise under the car, and supposing that a brake rod had broken loose, jumped up to catch the bell line in order to ring down the engineer. In another second I was lying out on the side of the track and my car was flying through the air straight over the telegraph wire on the other side. It went over without breaking a wire, jumped over the engine, which was lying at the bottom of the embankment, and brought up in the woods. Two cows on the track had caused an ugly accident. The train was full of passengers, but nobody except the engineer and fireman received serious injuries."

"There's always one funny thing about a railroad accident," Clerk Harris continued, as he brought the heel of the right foot to the floor, and resumed his seat on the truck. "People who are not hurt invariably make ridiculous those that are, by injudicious attentions to them. In the accident I have just mentioned the fall from my car slightly stunned me. Somebody gave me an opiate, and then everybody else made me take a drink of whisky. The result was I soon became gloriously drunk."

Baggage Agent Cherry finished checking a trunk and said :

"Tom Clayton ——"

"Which Tom Clayton?" interrupted the old fellow with the hammer.

"Why, Tom Clayton, the Southern Express Co.'s agent at Albany," Agent Cherry replied. "Tom Clayton was an express messenger on the fast through train that was run from Atlanta to Savannah on the Central Railroad during the Philadelphia Centennial in 1876. Leaving Atlanta one day, the train was two hours behind time. Telling me about the quickness of the run to Macon, Tom said :

"'They talk a good deal about the fast schedules on the Central Railroad, but no train on the road equals the speed of that Centennial train in 1876, when it was two hours behind time leaving Atlanta, one day. I tell you, sir, when the train left Forsyth, it was running 400 miles an hour, and if it had run off the track, it would have killed everybody in Monroe County!'"

"Know Garner, J. H. Garner, Master of Trains on the Brunswick Division of the East Tennessee, Virginia & Georgia Railroad?" asked one of the party.

Receiving a general assent, the speaker continued:

"The other day, Garner told me about an accident that happened to a train he was on one day while he was building a railroad in Mexico.

"'I was riding on the engine,' he said, 'and between it and the rear cars were two cars loaded with dynamite, which was used in blasting out rock. The rate of speed was not high, but by one of those unaccountable accidents that sometimes occur, the dynamite cars got off the track. One of them reared up on the tender of the engine, and I thought an explosion, which wouldn't leave an atom of the train, or of anybody that was on it, would surely occur. It didn't occur, however, and I told the engineer to pull the throttle valve wide open and get into safer quarters. He obeyed the order and we pulled away, leaving the car standing on one end. When I got ready to clear the wreck I had the car securely propped up, and then the dynamite was carefully taken out and carried off to a safe distance from the track.'"

Another member of the party began to tell of how the conductors kicked when they were first required to wear blue suits and brass buttons, but he was silenced by the approach of the train from Savannah, and the abrupt departure of the old fellow with the hammer, who went off to tap the wheels to see if they were in good order.—*Atlanta (Ga.) Constitution, Sept.* 5.

Quarantining the Sleepers.

As an extra precaution against smallpox, the Pullman and Wagner sleeping cars running between New York and Montreal, and Boston and Montreal, will stop at St. Albans, Newport and Rouse's Point, where changes will be made to sleepers plying between those places and Montreal, each of which will be disinfected daily.

Train Robbers.

The Chicago & Alton Railroad Co. gives notice that a "reward of $1,000 will be paid for the arrest and conviction of each one of the four parties who attempted to rob the passengers upon a Chicago & Alton train, near Blue Springs, Mo., Sept. 2. A liberal reward will be paid for information that will lead to the arrest and conviction of the parties mentioned above."

A Girl Train Wrecker.

A dispatch from Cartersville, Ga., Sept. 2, says : "A 15-year old girl named Emma Magruder has been placed in jail here for attempted train wrecking. It has been ascertained that she fired a corn-crib at Eves station, and subsequently placed obstructions on the track of the Rome Railroad. It is believed she is insane."

An Improvised Signal.

A serious accident was prevented a night or two since at Birmingham, on the Pittsburgh, Fort Wayne & Chicago road, by the forethought of C. Hoevler, who lives near that point. He observed a place where the heavy rain had washed away a portion of the railroad track. He knew that the Erie express would pass on its way to Allegheny in a few minutes, and that he would not have enough time to get a lantern. He accordingly tore some leaves from a note-book, which he lighted as the train came in sight. Although the

light was feeble, the engineer stopped for it. When the trainmen and passengers learned from what danger Mr. Hoevler's signal had rescued them, they overwhelmed him with thanks. The Pennsylvania Co., in recognition of the service, presented him with a pass over its lines for life.

An Old-Time Fast Trip.

Some of our readers may remember a fast run which attracted a good deal of attention some 25 years ago, when John Brougham, the comedian, and his company played in New York and Philadelphia the same night, a special train carrying them through in a little over an hour and a half. From Jersey City to New Brunswick the train was taken by the "H. R. Remsen," of the New Jersey Railroad, and from New Brunswick to Camden by the "Delaware," of the Camden & Amboy road. Engineer Ralph Page, who ran the "Remsen," died several years ago, and John Cobson, the engineer of the "Delaware," died in Bordentown, N. J., on Monday of last week. The train was saluted with bonfires and rockets all along the line.

The "H. R. Remsen" was one of three or four engines on the New Jersey Railroad which did some very fast running in their time. They were light engines, judged by the present standard, having 15 by 20 in. cylinders and 6 ft. drivers.

If some of our readers could give the exact time of the run above referred to, it would furnish an interesting comparison.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago & Eastern Illinois, annual meeting, at the office in Chicago, Oct. 6, at noon. Transfer books close Sept. 25.

Lake Erie & Western, annual meeting, in Bloomington, Ill., Oct. 14.

Louisville & Nashville, annual meeting, at the office in Louisville, Ky., Oct. 7, at noon.

Minneapolis & St. Louis, annual meeting, in Minneapolis, Minn., Oct. 6. Transfer books close Sept. 5.

Northern Pacific, annual meeting, at the office in New York, Sept. 17.

Ohio & Mississippi, annual meeting, at the office in Cincinnati, Oct. 8. Transfer books close Sept. 12.

Western Union Telegraph Co., anuual meeting, at the office in New York, Oct. 14.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Lehigh Valley, 1 per cent., quarterly, payable Oct. 15, to stockholders of record on Sept. 21. This company drops from 1½ to 1 per cent.

Manhattan, 1½ per cent., quarterly, payable Oct. 1, to stockholders of record on Sept 19.

Missouri Pacific, 1¾ per cent., quarterly, payable Oct. 1, to stockholders of record on Sept. 19.

New York, Lackawanna & Western (leased to Delaware, Lackawanna & Western), 1¼ per cent., quarterly, payable Oct. 1.

Western Union Telegraph, 1½ per cent., quarterly, payable Oct. 15, to stockholders of record on Sept. 19.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be as follows:

The *National Association of General Passenger & Ticket Agents* will hold its next half-yearly meeting in New York, at 11 a. m., on Tuesday, Sept. 15.

The *American Institute of Mining Engineers* will hold its fall meeting in Halifax, Nova Scotia, beginning on Wednesday, Sept. 16.

The *Brotherhood of Locomotive Firemen* will hold its annual convention in Philadelphia, on Monday, Sept. 21.

The *Western Railway Club* will hold its next regular meeting in Chicago, on Wednesday, Sept. 23.

The *General Time Convention* will meet at the Grand Pacific Hotel, in Chicago, on Thursday, Oct. 8.

The *Southern Time Convention* will meet at the National Railway Exchange, No. 46 Bond street, New York, on Wednesday, Oct. 14.

The *Roadmasters' Association* of America will hold its annual convention in Chicago, beginning on Wednesday, Oct. 14.

The *Association of American Railroad Superintendents* will hold its semi-annual meeting at No. 46 Bond street, New York, at 10 a. m., on Thursday, Oct. 15.

The *Central Club of Car Accountants* will hold its next meeting in Columbus, O., on Wednesday, Nov. 18.

Western Railway Club.

The next meeting will be held in Chicago, on Wednesday, Sept. 23. The following subjects were selected for discussion at this meeting:

1. The Necessity of Automatic Brakes on Freight Cars, and whether there should be Brakes on both Trucks. (Proposed by Mr. Verbryck.)

2. On the Selection and Qualifications of Shop Foremen. (Proposed by President Stevens.)

Railroad Traveling Auditors' Association.

The fifth annual meeting of the Railroad Traveling Auditors' Association was held in Detroit, Mich., Aug. 28, Mr. Richard Tenby, President, in the chair, and a large attendance of members. The morning session was devoted to transactions of routine business. An afternoon session was held, which was devoted to the discussion of various systems of railroad accounts, with a view to promoting uniformity in method. Several points in railroad practice concerning the interchange of business were also discussed.

The meeting was closed by an evening session, at which officers were elected, and it was decided to hold the next annual meeting at Niagara Falls on the last Wednesday in August, 1886.

Central Club of Car Accountants.

A meeting was held in Cleveland, O., Aug. 19, pursuant to a call issued some time before for the formation of a club, to be auxiliary to the Car Accountants' Association somewhat in the same manner as the railroad clubs in New York, Boston and Chicago are auxiliary to the Master Car-Builders' and Master Mechanics' associations. At the Cleveland meeting a number of car accountants were present. Mr. E. Yardley was called to the chair, and Mr. S. P. Sechrist was chosen Secretary. Mr. A. W. Davies briefly stated the object of the meeting.

It was resolved to organize the Central Club of Car Accountants, and articles of association and by-laws were presented and adopted. The membership is open to any member of the Car Accountants' Association who will pay a moderate annual fee and who is a resident of Ohio, Michigan or the contiguous territory, the outer limits of the territory being roughly indicated as Erie, Pittsburgh and Wheeling on the east and Louisville, Indianapolis and Fort Wayne on the west. The organization is a very simple one, being purposely made so to facilitate the convenience of members and forward the objects of the club. After the articles of association had been adopted a permanent organization was completed by the election of officers.

In the afternoon another session was held, at which letters were received from a number of car accountants, expressing their approval of the objects of the association, and the Club went to work by discussing reports of cars for which repair bills have been rendered and some other kindred subjects. Most of the discussions were informal and included the following subjects:

Importance of exchanging reports of cars detained at stations on account of freight being refused.

Reporting mileage on cars hauled empty to owners for repairs.

Reporting mileage on line cars hauled long distances to store on account of blockade at terminals.

It was resolved to publish the proceedings of the Club in *Sechrist's Hand Book*. The Club adjourned to meet in Columbus, O., on the third Wednesday in November.

ELECTIONS AND APPOINTMENTS.

Canadian Pacific.—Mr. Thos. G. Shaughnessy is appointed Assistant General Manager. Mr. Alex. C. Henry is appointed Purchasing Agent. The offices of both will be at Montreal.

Central Club of Car Accountants.—This new Association has elected the following officers: Chairman, C. J. Fellows; Secretary, D. W. Mooar; Finance Committee, George H. Weeks, H. C. Johnson and J. W. Bone.

Chicago & Atlantic.—At the annual meeting in Huntington, Ind., Sept. 3, the following directors were chosen: Tompkins Lewis, Indianapolis; Thomas Espy, Kenton, O.; C. L. Atterbury, J. H. Benedict, Hugh J. Jewett, John King, Jr., S. B. Smith, C. C. Waite, New York. The board elected Hugh J. Jewett President; E. B. Guthrie, Secretary; E. E. Willis, Treasurer.

Cincinnati & Eastern.—Mr. J. C. Homer is appointed Master Mechanic in place of Arthur Donaldson, resigned.

Connecticut & Passumpsic Rivers.—At the annual meeting in Newport, Vt., Sept. 2, the old board was re-elected, and afterward re elected Emmons Raymond President; N. P. Lovering, Clerk and Treasurer.

East Tennessee, Virginia & Georgia.—The following order from General Manager C. H. Hudson is dated Knoxville, Tenn., Sept. 1:

"Maj. John F. O'Brien, Assistant General Manager, having resigned to accept a position on another road, the office is this day abolished."

Mr. Samuel H. Hardwick is appointed General Eastern Agent, with office in New York. He has been General Traveling Agent for several years.

Harrisburg, Portsmouth, Mt., Joy & Lancaster.—This company, whose road is leased to the Pennsylvania Railroad Co., has elected the following directors: Edmund Smith, George B. Roberts, Wistar Morris, John M. Kennedy, N. Parker Shortridge, James Young, Lewis Elkin, A. J. Cassatt and John B. Green.

New York & Sea Beach.—Mr. Albon P. Man has been chosen President in place of Wm. O. McDowell, resigned. Mr. Alrick H. Man has been chosen Managing Director and Treasurer, and will have the active management of the road.

Railroad Traveling Auditors' Association..—At the annual meeting in Detroit, Aug. 26, the following officers were chosen: President, George E. Terry, Albany, N. Y., Delaware & Hudson Canal Co.; Vice-President, F. N. Hayden, Buffalo, N. Y.; Secretary and Treasurer, T. H. Grosse, Battle Creek, Mich., Chicago & Grand Trunk road.

St. Joseph Valley.—The office of this new company is on South Bend, Ind.; the directors are Charles A. Clark, Wm. G. George and Job Wolverton.

San Antonio & Aransas Pass.—At the annual meeting in San Antonio, Tex., Sept. 2, the following directors were chosen: A. Belknap, Henry Elmendorf, Wm. Heuerman, G. H. Kalteyer, Edward Kotulla, A. J. Lockwood, Uriah Lott, W. H. Maverick, Daniel Sullivan.

Wabash, St. Louis & Pacific.—The headquarters of Mr. L. S. McClellan, Southeastern Passenger Agent of this company, have been removed from 323 Broadway, New York city, to 327 Hamilton street, Allentown, Pa. All communications relating to business in that territory should be addressed to him at Allentown.

Wyandotte, Nebraska & Northwestern.—The officers of this new company are: C. Richardson, President; John J. Cruise, Vice-President; N. McAlpin, Secretary and Treasurer; E. S. W. Drought, General Manager; L. W. Keplinger, Attorney; Wm. B. Knight, Chief Engineer. Office in Wyandotte, Kansas.

PERSONAL.

—Mr. Arthur Donaldson has resigned his position as Master Mechanic of the Cincinnati and Eastern road.

—Mr. H. G. H. Reed has resigned his position as General Manager of the Milwaukee, Lake Shore & Western road.

—Mr. J. Waldo has resigned his position as Vice-President of the Houston & Texas Central Co. to accept the office of commissioner of the Texas Traffic Association.

—The report that Mr. J. F. O'Brien had resigned his position as Assistant General Manager of the East Tennessee, Virginia & Georgia road is confirmed. It is understood that Mr. O'Brien has accepted an important position on another road.

—Mr. A. B. Leet, who resigned his position as General Passenger Agent of the Grand Rapids & Indiana road about a year ago on account of ill health, has settled in El Paso, Tex., where he will find some congenial occupation and some employment for his spare time by acting as arbitrator of the El Paso pool.

—It is reported that Mr. Robert Andrews, now Superintendent and Engineer of the Virginia Midland road, will succeed Col. Rives as General Manager of the Richmond & Danville. Col. Andrews was for a number of years connected with the Wabash and has been on the Virginia Midland but a few months, having succeeded Mr. W. M. S. Dunn.

—Mr. W. M. S. Dunn, General Superintendent of the Cape Fear & Yadkin Valley road, who has been sick at his home in Virginia for some two months past, has recovered his health and returned to duty. During his absence Mr. E. T. B. Glenn, Chief Clerk and Car Accountant, was left in charge of the road, filling his position with ability.

—It is understood that Col. A. L. Rives has tendered his resignation as General Manager of the Richmond & Danville and its controlled lines, and that it has been accepted. Col. Rives was for a number of years on the Mobile & Ohio road, where he made an excellent reputation for himself. He went to the Richmond & Danville about two years ago, succeeding Col. T. M. R. Talcott. The reason for Col. Rives' resignation is not stated.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Eight months to Aug. 31:				
Canadian Pacific.	$5,061,465	$3,213,226	I. $1,848,239	57.5
Central Iowa.....	764,203	903.434	D. 139.231	15 4
Chicago & Alton.	5,023.917	5,456,702	D. 432,785	8.0
Chi. & East. Ill..	1,003,086	967.279	I. 35.807	3.7
Chi., Mil. & St. P.	14,"76,000	14,202.086	I. 73,914	0.5
Chi. & Nor'west.	14,682,489	14,672,886	I. 9,603	0 1
Ch St. P., M.&O.	3,456 339	3.629,753	D. 172,814	4 8
Chi. & W. Mich..	817.277	1,012.220	D. 194,943	19 3
C., L, St. L. & C.	1,500,640	1,524.463	D. 23,823	1.6
Denver & R. G..	4.226,486	3 789.832	I. 436,654	11.5
Det., Lan. & No.	757,342	893,768	D. 136,426	15.3
Illinois Central..	6,686 518	6,310,305	I. 376.153	6.0
Iowa lines.....	995.078	1,054,449	D. 59,371	5 6
Ind., Bloom.& W.	1,501,445	1.479,314	I. 22.131	1.5
Long Island.....	1,923,424	1,891,086	I. 32,338	1.7
Louisv. & Nash..	8,920,157	8,7 6 564	I. 193,593	2.2
Mil., L. S. & W..	792,436	728,468	I. 63.968	8 8
Norfolk & West..	1,667.067	1,652.514	I. 14,553	0 9
Northern Pacific.	6,582,339	8,040.626	D. 1,458,287	18.1
Peoria, Dec. & E.	461,606	499.928	D. 38,322	7.7
Roch. & Pitts....	770,621	721,777	I. 48.844	6.8
St. L. & San F..	2,663.744	2,918,321	D. 254.577	8.7
St. P. & Duluth.	742,609	739,360	I. 3,249	0.4
Seven months to July 31:				
Canadian Pac...	$4,260,465	$2,647.411	I. $1,613,054	60.9
Net earnings...	1,558,940	63,872	I. 1,495,068	....
Chi.. Bur. & Q...	14,185,801	13,351.221	I. 834.580	6.3
Net earnings...	5,850,622	5,801,764	I. 48.858	0.8
Northern Pacific.	5,606,471	7,008 024	D. 1,401,553	19.9
Net earnings...	2,470,224	3.253,797	D. 783,573	24.1
Ohio & Miss.....	2,020,.14	2,078,109	D. 57,895	2.8
Net earnings...	469,338	260,324	I. 2'9.014	80.4
Union Pacific....	13,529.520	13,369,716	I. 159,804	1.2
Net earnings..	4,287,446	4.600,792	D. 313,346	6.8
Month of July:				
California South.	$10.464	.....	.. ..	....
Canadian Pac. ..	907,638	$539,367	I. $358,271	65 2
Net earnings ..	445,579	154.694	I. 290,885	187.6
Ches. & Ohio....	280.213	320,938	D. 40,725	12.5
Net earnings..	90,839	116,487	D. 15 648	13.4
Ches., O. & S. W.	131,673	108,671	I. 23,002	21.1
Net earnings...	50,081	34,347	I. 15,734	46.2
Chi , Bur. & Q....	1,812.834	1,735,199	I. 77,635	4.5
Net earnings...	694,976	642,794	I. 52,182	8.1
Eliz., Lex. & B. S.	58,050	74,856	D. 16,806	22.4
Net earnings...	21,987	32,498	D. 10,511	32.8
Kentucky Cent..	71.009	95,593	D. 24,584	25.6
Net earnings...	25,007	34.347	D. 9,340	27.5
Northern Pac. ..	1,000,011	1,022,438	D. 22,427	2.2
Net earnings...	549,444	493.398	I. 56,051	11 4
Ohio & Miss.....	281,799	282,202	D. 403	0.1
Net earnings...	84.623	74,114	I. 10.509	14.2
Union Pacific....	2.304,990	2,375,899	D. 70,909	2.9
Net earnings...	1,012,760	1,241,069	D. 228,309	18.4
Month of August:				
Canadian Pac....	$801,000	$586,000	I. $215,000	36.7
Central Iowa.....	112.808	119,821	D. 7,013	5.8
Chi. & Alton	724,596	859,902	D. 135,506	15.7
Chi. & East. Ill...	146.499	150,514	D. 4,015	2.7
Chi , Mil. & St. P.	1,767,000	1,855,348	D. 88,348	4.7
Chi. & Nor'west.	1,928,000	2,027.700	D. 99,700	4.9
C., St. P., M. & O.	475,400	469.500	I. 5,900	1.3
Chi. & W. Mich..	103.414	118,130	D. 14.716	12.5
C., I. St. L & C.	199,534	244,117	D. 44.583	18.3
Denver & R. G...	574,667	476,362	I. 98,305	20.6
Det., Lan., & No.	109,904	116.801	D. 6.897	5.9
Illinois Central..	831,797	822.552	I. 9,245	1.1
Iowa lines.....	116.558	125,742	D. 9,184	7.3
Ind., Bloom. & W.	242.800	228.851	I. 13,949	6.1
Long Island.....	380,904	389,258	D. 8,354	2.1
Louisv. & Nash..	1,070.895	1,116,312	D. 45,417	4.1
Mil., L. S. & W.	131.305	96.031	I. 35,274	36.8
Norfolk & West..	219,770	220,188	D. 418	0.2
Northern Pacific.	975.898	1,032,602	D. 56,704	5.5
Oreg. R. & N. Co.	443.900	326 900	I. 117,000	35.8
Net earnings...	222,100	99.000	I. 122.200	122.3
Peoria, Dec. & E.	80,085	79,835	I. 250	0.3
Roch. & Pitts ..	107,660	112,541	D. 4.881	4.3
St. L. & San F...	359,000	432.000	D. 73,000	17.0
St. P. & Duluth..	123,118	126,253	D. 3,135	2.5

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Coal.

Anthracite coal tonnage, as given by the weekly reports of the companies, has been as follows for the eight months to Aug. 29 for eight years past:

	Tons.		Tons.
1885.....	18.625,243	1881	18.028,921
1884.....	18,706,854	1880.....	14.216,454
1883	19,411,623	1879.....	16,972.754
1882.....	18,503,926	1878....	10,737,415

This year's tonnage is very nearly up to that of last year, and is larger than that reported for any year previous to 1883. It is possible, however, that there will be a falling off in the remaining months of the year.

Bituminous coal tonnages for the eight months to Aug. 29 are reported as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Cumberland, all lines....	1,771.566	1,838,515	D. 66,949	3.6
Huntingdon & Broad Top	101,703	125,802	D. 24,099	19.1
Barclay R. R. & Coal Co.	156,217	195,606	D. 39,389	20.1
Pennsylvania R. R:				
Clearfield...	1.917,165	2,049,270	D.132,105	6.5
Penn and Westmoreland	751.719	850,556	D. 98,837	11.6
Minor districts...	1,020,998	951,507	I. 69,491	7.3
Total....	5,719,368	6,011,256	D.291,888	4.8

All the leading districts show a decrease in tonnage, the only gain being in some of the smaller districts on the Pennsylvania Railroad.

Coke tonnages for the eight months to Aug. 29 were:

	1885.	1884.	Inc. or Dec.	P. c
Southwest Penna. R R....	1,268,095	1,488,280	D. 220,185	14.8
Other districts, Pa. R. R..	397.236	316,936	I 80,300	25.3
Connellsville, *via* Pa. R. R.	38.575	232,118	D. 193,543	83.4
Total	1,703,906	2,037,334	D. 333,428	16.4

These tonnages are all over the Pennsylvania Railroad, which is the only company reporting coke shipments regularly.

The coal tonnage of the Pennsylvania Railroad Division of the Pennsylvania Railroad for the eight months to Aug. 29 was:

	1885.	1884.	Inc. or Dec.	P. c.
Coal.....	7,089,219	6,697,933	I. 391,286	5.8
Coke	1,676,849	2,022,880	D. 346.031	17.1
Total.....	8,766,068	8,720,813	I. 45,255	0.5

This includes all tonnage passing over the line, whether originating on the road or received from other lines.

Actual tonnage passing over the Pennsylvania & New York

road for the nine months of its fiscal year from Dec. 1 to Aug. 29 was:

	1885.	1884.	Decrease.	P.c.
Anthracite	924,682	966,476	41,794	4.3
Bituminous	177,882	229,787	51,905	22.6
Total	1,102,564	1,196,263	93,699	7.8

The larger part of the anthracite comes from the Lehigh Valley road, of which this line is an extension.

For the seven months ending July 31 the Southwest Virginia Improvement Co. shipped from its mines at Pocahontas, Va., over the Norfolk & Western road, 272,929 tons of coal. Shipments from the Bluestone mines were 71,878 tons, making the total shipments over the road from the Flat Top region 344,807 tons.

Anthracite coal shipments over the Shamokin Division, Northern Central road, for the eight months to Aug. 29 were, this year, 610,350; last year, 664,161; decrease, 53,811 tons, or 8.1 per cent.

At a meeting of the lines interested in Cleveland last week, it was resolved to restore rates on anthracite coal from Buffalo, Salamanca and Suspension Bridge to the full tariff adopted July 1, such restoration to take effect Sept. 14.

Cumberland coal shipments for the week ending Sept. 5 were 62,004 tons. Total to Sept. 5 this year, 1,833,569; last year, 1,887,570; decrease, 54,001 tons, or 2.9 per cent.

California Through Freights.

Shipments of through freight eastward from California points for the half-year ending June 30 were, in tons:

	San Francisco.	Interior.	Total.	P. ct.
Central Pacific	27,124	14,696	41,820	55.0
Southern Pacific	23,056	11,107	34,163	45.0
Total	50,180	25,803	75,983	100.0

Leading items of freight were 13,004 tons sugar, 11,515 tons oranges, 8,085 tons wool, 5,004 tons wine, 3,312 tons tea, 3,110 tons canned goods, 2,398 tons barley, 1,054 tons beans and 1,034 tons coffee. No other article furnished over 1,000 tons.

Southern Passenger Rates.

The Western & Atlantic this week has made an active cut in passenger rates from Atlanta and other points to northern and western cities. On Sept. 7 tickets were sold from Atlanta to New York at $15; to Washington at $8.50, and to Richmond and Norfolk at $8. The cut was promptly followed by the East Tennessee, Virginia & Georgia road, and it is expected that further cutting will follow.

Southern Railway & Steamship Association.

The following circular has been issued by General Commissioner Virgil Powers, dated Atlanta, Ga., Sept. 3:

"Considerable complaint is made to me of underbilling weights of car load shipments of freight. Attention was called to this matter and the following resolution unanimously adopted by the Rate Committee at its 42d session held, at New York, April 2, 1885.

"*Resolved*, 'That all receiving and delivering roads shall weigh, when practicable, all car loads of property, under penalty of $25 fine for not doing so.'

"The attention of officers and agents of all roads is called to this direction of the Rate Committee. See that it is rigidly enforced and correct weight charged for as per classification and tariffs."

Lake Superior Iron Ore.

Shipments of iron from the Lake Superior region from the opening of navigation up to Sept. 2 are reported by the Marquette *Mining Journal* as follows:

	Marquette Dis.	Menominee Dis.	Total.
From L'Anse	19,136	.....	19,136
From Marquette	453,364	.....	453,364
From Escanaba	363,074	472,414	835,488
From St. Ignace	62,952	.....	62,952
Total	898,526	472,414	1,370,940

For the corresponding period last year the total shipments were 1,808,965 tons, showing a decrease this year of 438,025 tons, or 24.2 per cent. Pig iron shipments this year to Sept. 2 have been 7,457 tons.

The Minnesota Iron Co. has shipped from its mines at Vermillion Lake this year 148,746 tons of ore, this being the first season in which shipments have been made. This ore is carried over the Duluth & Iron Range road to the shipping port at Two Harbors, Minn., on the north shore of Lake Superior.

Boston Traffic Notes.

The North Adams car record office shows the number of cars received from and delivered to roads operating over the Troy & Greenfield Railroad for the month of July, 1885, as follows: Fitchburg Railroad, 13,657; Boston, Hoosac Tunnel & Western, 12,369; Troy & Boston, 3,370; New Haven & Northampton, 972; total, 30,368.

Cotton.

Cotton shipments for the week ending Sept. 4, the first week of the new cotton year, are reported as follows, in bales:

Interior markets:	1885.	1884.	Inc. or Dec.	P. c.
Receipts	15,423	7,388	I. 8,035	108 7
Shipments	24,663	9,271	I. 15,392	166.0
Stock, Sept. 4	17,308	16,864	I. 444	2.6
Seaports:				
Receipts	22,769	15,101	I. 7,668	51.1
Exports	1,809	4,839	D. 3,030	62.6
Stock, Sept. 4	137,423	111,205	I. 26,218	23.6

The total shipments from plantations from Sept. 1 to Sept. 4 are estimated at 21,461 bales, against 16,665 in 1884 and 37,728 in 1883.

Cotton Rates.

A circular from the Southern Railway & Steamship Association notes cotton rates to southern and eastern ports, which are the rates of last season, continued in force. Arbitraries and rates to interior New England towns also continue in force the same as last season. Rates from leading points in cents per 100 lbs. are:

	Savannah.	Norfolk.	Baltimore.	New York.	Boston.
From Augusta	27	40	51	57	67
" Atlanta	45	56	67	75	85
" Montgomery	45	56	67	75	85
" Albany, Ga.	49	..	76	82	92

Rates from other points are in proportion. To Charleston the rates are the same as to Savannah; to Philadelphia the same as to New York; Providence and Fall River take Boston rates.

A Manitoba Pool.

A Chicago dispatch of Sept. 9 says: "The St. Paul, Minneapolis & Manitoba Railroad Co., whose line is entirely within the United States, has entered into a pooling agreement with the Canadian Pacific Co. which virtually shuts out the roads between Chicago and St. Paul from participating in the traffic between Canadian and Manitoba points. This pooling arrangement includes both freight and passenger business, and by it the Manitoba is to receive something like 12 or 14 per cent. of the rate from Canadian to Manitoba points on all business done by the Canadian Pacific.

"For this concession the Manitoba line agrees to charge such rates as to prevent business for Manitoba from Canada going through the United States. The tariff agreed upon between the two companies from St. Paul, Minneapolis, and Minnesota points to Emerson and Winnipeg makes the rate to Emerson the same as to Winnipeg, and advances all the old rates. The arrangement now in force between the Manitoba line and the Northwestern Traffic Association will be abandoned. It is the intention of the association roads to stop all pro-rating arrangements on all kinds of business with the Manitoba and charge the latter full tariff rates between St. Paul and Chicago. All agents in Canada and Manitoba will also be withdrawn."

The Decatur Pool.

A Chicago dispatch of Sept. 9 says: "The representatives of the roads interested in the Decatur pool held a meeting here to-day, and after a long discussion decided to again admit the Champaign, Havana & Western on terms satisfactory to that company. The following new percentages were agreed upon: Wabash, 39.8; Indianapolis, Decatur & Springfield, 14.2; Champaign, Havana & Western, 10, and Illinois Midland, 10. The Indianapolis, Decatur & Springfield before had 17 per cent., and at first refused to take less than 16 per cent. under the new arrangement, but after considerable discussion it became convinced that a war would be the inevitable result if it declined to make the proper concessions, and it agreed to accept the above percentage."

Transcontinental Association.

A meeting of the Transcontinental Association began in St. Paul, Sept. 8, a full representation of the lines in the association being present. The first day's meeting was chiefly occupied with a discussion of the divisions in the pool, and the Southern Pacific Co. asked for a re-award of percentages, but the question was not decided.

RAILROAD LAW.

Telegraph Rights of Way in Arkansas.

The Western Union Telegraph Co. applied to the courts at Little Rock, Ark., last week, for an injunction to prevent the Arkansas Telegraph Co. from building a telegraph line along the right of way of the Little Rock, Mississippi River & Texas Railway between Pine Bluff and Little Rock, claiming an exclusive contract with the railroad company. The injunction has just been denied, because at the last session of the Arkansas Legislature a telegraph law was passed granting telegraph companies rights of way on all railroads in the state of Arkansas. The Arkansas Telegraph Co. is a branch or extension of the Baltimore & Ohio system to Little Rock, Hot Springs and other important places in Arkansas.

A Land Grant Case.

A Leavenworth, Kan., dispatch says that on Sept. 3 Judge Brewer of the United States Circuit Court, in an equity case brought by the Attorney-General of the United States against the Kansas City, Lawrence & Southern Kansas Railroad Co., made an important decision against the defendant's claim to hold some 27,000 acres of land, valued at several millions of dollars. The bill was filed Jan. 25, 1883, and alleged that the railroad company unlawfully held the land, having obtained patents to which it was not entitled. These lands are in Allen County and are improved farms, and the titles to many other lands are indirectly involved. The railroad company claimed the lands under a transfer from the Missouri, Kansas & Texas Railroad Co., and that company by a transfer from the Atchison, Topeka & Santa Fe, and also by an independent grant to itself. It seems the grant to the Atchison, Topeka & Santa Fe Co. required that company to build a branch down the Neosho Valley. The grant was made March 3, 1863. The Atchison, Topeka & Santa Fe Co., instead of building the branch, transferred its right to do so to the Missouri, Kansas & Texas. Afterward Congress made a grant July 4, 1866, to the Missouri, Kansas & Texas Railroad Co. for a line down the Neosho Valley. The company built such a line, but not such a branch of the Atchison, Topeka & Santa Fe as required by the grant to that company. Judge Brewer held that the Atchison, Topeka & Santa Fe Co. could not transfer its right in the branch road, and that, even if it could, that branch had not been built, but an entirely independent line belonging to a different system. The Missouri, Kansas & Texas Co. had attempted to get both grants while only building one road, and Judge Brewer held that the second grant superseded the first, and the patents issued under the first grant to the Atchison, Topeka & Santa Fe Co. were void. He further held that the company could not claim the lands under the act of 1866, because it had made no selection under that act.

OLD AND NEW ROADS.

Asheville & Spartanburg.—Work is now progressing rapidly on the extension of this road from Hendersonville, N. C., to Asheville. The distance is 21 miles and the present intention is to have the line finished by November. About half the grading is now ready for the rails and tracklaying has been begun at the Swannanoa River.

Baie Chaleur.—Surveys are now being made for this road, for which the Canadian government has granted a subsidy of $300,000. The line is to connect with the Intercolonial road and to run through the Gaspe Peninsula, at present an almost undeveloped territory. It is not yet decided whether the connection with the Intercolonial will be made at Campbellton, N. B., or at Metapedia.

California Southern.—The July gross earnings of this road were $10,464 ($80 per mile), a gain of $1,787 over June last, and of $2,746, or 37 per cent., over July, 1883. The road was not operated in July, 1884, traffic having been stopped by disastrous wash-outs.

Canadian Pacific.—The following are gross and net earnings for July and for seven months to July 31:

	July.		Seven months.	
	1885.	1884	1885.	1884.
Gross earnings	$907,638	$549,367	$4,260,468	$2,647,411
Operating expenses	462,059	394,673	2,701,525	2,583,539
Net earnings	$445,579	$154,694	$1,558,940	$63,872

For the seven months gross earnings increased $1,613,054, or 60.9 per cent., and expenses only $117,986, or 4.6 per cent., leaving a gain of $1,495,068 in net earnings.

Cape Fear & Yadkin Valley.—This company is preparing for the fall business, and is turning out a number of new box and flat cars from its shops in Fayetteville, N. C.

The company adopted the stand signals recommended by the General Time Convention and has found that they work very well, meeting with general approval.

Central Pacific.—It is stated that work will shortly be resumed on the extension of the Oregon Division northward. About 120 miles remain to be built to complete the rail connection between San Francisco and Portland, this section including several tunnels and much other difficult work.

A Washington dispatch of Sept. 9 says: "Second Comptroller Maynard has made a report to the Secretary of the Treasury on the application of C. P. Huntington, Vice-President of the Central Pacific Railroad Co., to have compensation earned by the company in the Government service over the non-subsidized portions of its lines, amounting to some $900,000, paid over to the company. The Second Comptroller recommends that the amount be covered into the treasury and one-half applied to payment of accrued interest on Government aid bonds, and the other half placed to the credit of the sinking fund The Comptroller says that the company will sustain no loss in consequence of this disposition of the moneys, as the whole amount will be applied either presently or ultimately to the payment of its indebtedness to the United States, while greater security will be insured to the Government.

Chesapeake & Nashville.—Contracts have been let for about half the grading on this road, which is to extend from Nashville, Tenn., eastward about 125 miles, to a connection with the Cincinnati Southern road. The remaining contracts, it is stated, will be let shortly.

Chesapeake & Ohio.—The United States District Court has continued until Nov. 1, the injunction restraining the sheriffs and other officers from collecting taxes assessed against this company in West Virginia.

Chicago, Burlington & Northern.—The option of Chicago, Burlington & Quincy stockholders to subscribe to the securities of this company expired Sept. 4, and it is announced that all the stock has been taken. The rights to subscribe, which were transferable, commanded a good price in the market and quite a number of them changed hands.

E. P. Reynolds & Co., the general contractors, have sublet already a large portion of the work, and the contractors are going to work. Contracts have also been made for the equipment of the new line, the delivery of which is to begin Jan. 1 next.

Chicago, Burlington & Quincy.—The gross and net earnings for July and for the seven months ending July 31 have been as follows:

	July.		Seven months.	
	1885.	1884.	1885.	1884.
Gross earnings	$1,812,834	$1,735,199	$14,185,801	$13,351,221
Oper. expenses	1,117,858	1,092,405	8,335,179	7,549,457
Net earnings	$694,976	$642,794	$5,850,622	$5,801,764

For the seven months the gross earnings increased $834,580, or 6.3 per cent., and the expenses $785,722, or 10.4 per cent., leaving a gain of $48,858, or 0.8 per cent., in net earnings.

A new branch of this company's Burlington & Missouri River line has been completed and opened for business. It extends from Holdrege, Neb., on the Kennesaw Cut-off, west by north to Elwood, a distance of 29 miles.

Chicago, Rock Island & Pacific.—Chicago reports seem to credit this company with an indefinite desire to extend itself in all directions. A week or two ago it was reported to have purchased a controlling interest in the Northern Pacific, and the latest rumor is that the company has purchased the St. Joseph & Grand Island road and will extend it from Grand Island, Neb., to Denver. It has always been understood that the Union Pacific owned a controlling interest in this line, which it would hardly be likely to part with, especially to a company which could use it to its disadvantage.

Cincinnati, Hamilton & Dayton.—The freight station of this road in Cincinnati was destroyed by fire on the night of Sept. 3. The building was a frame structure 500 ft. long, and contained at the time a considerable quantity of freight. The loss is estimated at $75,000, and is about half covered by insurance.

Cincinnati, New Orleans & Texas Pacific.—It is reported that this company will endeavor to secure some modifications of its lease of the Cincinnati Southern road, with a view to reducing the amount of rent to be paid. This is hardly news, however, as everything indicates that the company has been planning to that end for a year or two past.

Columbus & Rome.—The directors of this company are making arrangements to begin work on the extension of the road from its present terminus at Greenville, Ga., northward to Fairburn on the Atlantic & West Point road. This will complete a new and pretty direct line between Columbus and Atlanta.

Danville, Olney & Ohio River.—The Special Master has submitted a report to the United States Circuit Court at Springfield, Ill., recommending that the Receiver be authorized to issue $125,000 in certificates for the purpose of paying running expenses and current debts. The Master also recommends the payment of a number of claims for supplies and labor.

Denver & Rio Grande Western.—Mr. Wm. J. Palmer, President of this company, has issued a circular to the holders of the first-mortgage bonds, in which he says that the lease of this road to the Denver & Rio Grande has been decided by the courts to be legal, and if anything can be recovered the suit against that company can be prosecuted.

The coupons on the first-mortgage Denver & Rio Grande Western bonds now remain unpaid since March 1, 1884, and the following plan has been proposed by holders of a large amount of the bonds, to wit:

To pay on account of coupons maturing after Sept. 1, 1885, and before and on March 1, 1889, an average of 50 per cent., distributed as follows: One-fourth of the coupons of March 1, 1886; one-half of those of Sept. 1, 1886, and of March 1 and of Sept. 1 in each of the years 1887 and 1888, and three-quarters of those of March 1, 1889; also interest half-yearly, as hereafter stated.

The matured coupons, and those above named, to be cut from the bonds and assigned to and deposited in trust for the benefit of the parties hereto, with Louis H. Meyer and Edward Lewis, now the mortgage trustees, uncanceled, with the right unimpaired to enforce the guarantee of their payment against the Denver and Rio Grande Railway Co.; and the lien of the first mortgage to secure the coupons to remain unaffected. On such deposit, certificates to be issued bearing 5 per cent. per annum interest, payable semi-annually (March 1 and Sept. 1), on the amount of coupons unpaid, from their maturity respectively.

In recommending this plan President Palmer remarks that the security of the coupons will remain unimpaired; that interest on the bonds is not scaled, but full payment will be resumed after March, 1889; that gross earnings of $1,000,000 a year will be sufficient to carry out this plan.

From the Receiver's statement, the earnings and expenses from July 12, 1884, to June 30, 1885, the first year of receivership, were as follows:

Gross earnings	$927,234
Expenses	715,452
Net earnings	$211,782
From which deduct rental of equipment, taxes, etc	55,691
Net income	$156,090

Of this balance $150,716 have been expended in additional construction, and the remainder is on hand.

Detroit, Bay City & Alpena.—Bids will be called for shortly for the grading of an extension of this road from the present terminus at Au Sable, Mich., northward to Black River, 30 miles.

Evansville, Washington & Brazil.—Work is progressing steadily on this road and track is now laid to Owl Prairie, Ind., 4 miles northward from the late terminus at Plainville, and 16 miles from Washington. The road follows the line of the old canal, and tracklaying will be continued until it reaches Worthington, where connection will be made with the Terre Haute & Southeastern road.

Greenwood, Laurens & Spartanburg.—This road is now nearly completed and will be opened for business about Sept. 15. It extends from Greenwood, S. C., on the Augusta & Knoxville road, northward through Laurens to Spartanburg, 66 miles. It is controlled by the Central Railroad Co., of Georgia, and extends into territory heretofore entirely served by the Richmond & Danville Co.'s lines. It is in fact an extension of the Augusta & Knoxville road and is intended to bring business to the Central Railroad and to Savannah.

Gulf, Colorado & Santa Fe.—The arbitration to which the striking workmen and the officers of this company both consented last week, has ended in the adoption of an agreement regulating the rates of wages and guaranteeing immunity to all the men engaged in the strike. This agreement has been signed by both parties.

Illinois Central.—It is understood that work will soon be begun on the extension of the Yazoo City Branch of the Southern Division, from Yazoo City, Miss., to Memphis. The statement is that the company intends to build about 75 miles the coming winter, the remainder of the road to be completed next year.

La Grange & Carrollton.—This company purposes building a railroad from La Grange, Ga., on the Atlanta & West Point road, northward to Carrollton, about 40 miles. It is intended to be a narrow gauge road for local traffic. The organizers of the company have bought the old road-bed which was graded a number of years ago for the North & South Railroad. This has been the property of the Columbus & Rome Co., but has not been used by that company, the extenslon of its road having been turned more to the eastward.

Lehigh Valley.—This company drops from 1½ to 1 per cent. on its October dividend. It paid 2 per cent. in January, 1½ in April and July, and now 1 in October, making 6 per cent. for the year. Previous dividends have been 8 per cent. in 1884 and 1883, 6½ in 1882, 5½ in 1881 and 4 in 1880 and 1879. The company has always been very conservative in its dividend policy.

Little Rock & Fort Smith.—This company's land sales for July were 920 acres for $3,274. For the seven months to July 31 the sales were 16,448 acres for $59,140, being an increase of 32 acres and $1,497 in amount over the corresponding period of last year.

Maine Shore Line.—The projectors of this road, from Hancock, Me., eastward to Calais, are actively engaged in working up subscriptions along the line. Nearly all the towns have voted to subscribe, with the exception of the important ones of Calais and Eastport, whose aid is necessary to the project.

Mexican Central.—The gross earnings of this road for July were $270,588 and the expenses $191,985, leaving the net earnings $78,603. Last year the gross earnings in July were $231,900, but the expenses exceeded them, leaving a deficit of $3,467 for the month. The cost of repairs was much heavier last year than now, nearly $48,000 being expended on the road-bed and tracks and more than $21,000 on the locomotives.

Milwaukee & Northern.—Reports have been current for some time past that this road was to be sold or leased to the Chicago, Milwaukee & St. Paul Co. It is now officially stated that no such action is contemplated, but that negotiations have been in progress which have resulted in the adoption of a traffic agreement in special relation to the lumber business, which forms a large part of the Milwaukee & Northern traffic.

Missouri Pacific.—A number of merchants of Kansas City recently asked this company to build a new branch from that city to Paola to connect with the line thence to Holden. President Gould replied that the present was not a favorable time for building railroads, and that the company could not afford to enter into the construction of any new branches unless the parties on the line were willing to aid. In this case he thought that a subscription of at least $4,000 per mile would be necessary to secure the building of the desired line.

Nashville, Chattanooga & St. Louis.—The directors of this company are considering the extension of several important branches of the road. It is proposed to extend the Lebanon Branch 20 miles to Carthage, the McMinnville Branch 6 miles to the Bon Air coal fields, the Fayetteville Branch 25 miles from Elora to Huntsville, and the Jasper Branch up the Sequatchie Valley. The extension of these lines will develop the resources of some of the best iron and coal counties in Tennessee.

New York, Pennsylvania & Ohio.—Argument was to have been heard in Pittsburgh, Sept. 3, by the United States Circuit Court on the injunction motion to dissolve the temporary injunction restraining the voting trustees from acting. Upon application of counsel for some of the stockholders, however, the case was adjourned to Sept. 18, when it will be heard by the Court at Williamsport.

Northern Pacific.—This company's statement for July, the first month of its fiscal year, is as follows:

	1885.	1884.	Inc. or Dec	P. c.
Earnings	$1,000,011	$1,022,438	D. $22,427	2 2
Expenses	450,567	529,045	D. 78,478	19.8
Net earnings	$549,444	$493,393	I. $56,051	11.4

Land sales in July were 33,460 acres. The total amount of sales, including town lots, was $134,734 for the month.

Ohio & Mississippi.—This company's statement for July and the seven months to July 31 is as follows:

	July.		Seven Months.	
	1885.	1884.	1885.	1884.
Earnings	$281,799	$282,202	$2,020,214	$2,078,109
Expenses	197,176	208,088	1,550,876	1,817,785
Net earnings	$84,623	$74,114	$469,338	$260,324

For the seven months the gross earnings decreased $57,895, or 2.8 per cent., and the expenses $266,909, or 14.7 per cent., the result being a gain of $209,014, or 80.4 per cent., in net earnings.

Pennsylvania.—Work is being pushed on the extension of the Schuylkill Valley Division, from Reading, Pa., to Hamburg. The contractors are hurrying up the work as much as possible, and preparations are being made for track aying and other work which is to be done by the company.

Rochester & Pittsburgh.—Argument on motion to vacate the injunction to prevent the sale of this road under foreclosure was heard in Rochester, N. Y., last week, and on its conclusion the Court granted an order vacating the injunction. The Court stated that there was no cause for continuing it, and that any question as to the indebtedness of Walston H. Brown, or the firm of Brown Bros., to the stockholders was not in the case. Unless some other legal steps are taken the sale will accordingly take place on Sept. 17, as ordered.

Rock Island & Peoria.—It is announced that this company has purchased the Rock Island & Mercer County Railroad and will hereafter operate that line. The Rock Island & Mercer County road extends from a junction with Rock Island & Peoria, 5 miles from Rock Island, Ill., to Cable, a distance of 22 miles. It is a coal road, and has always been operated as a branch of the Rock Island & Peoria road, and is chiefly owned by the same parties, so that the change is merely a formal one.

Rome & Carrollton.—Work is now well advanced on the grading of this road from Rome, Ga., to Cedartown. The company has purchased a locomotive and construction train, and track-laying has been begun

St. Joseph Valley.—This company has been organized for the purpose of building a line from South Bend, Ind., to Mishawaka, a distance of 5 miles.

St. Louis Coal Railroad.—A dispatch from Chester, Ill., Sept. 5, says: "The St. Louis Coal Railroad, at the time it passed into the hands of a receiver, was largely indebted to its employés, and Judge Gresham of the United States Court at Chicago ordered the issue of a certificate in each case. These, it was supposed, would be for the full amount due, but R. J. Cavett, the Receiver, upon making them out, deducted 3 per cent., claiming it to be a legal transaction, as the amount so deducted was for attorneys' fees. The employés of the Wabash, Chester & Western road, that part of the road operated by the Coal Railroad between this city and Pinckneyville and Tamaro refused, with a few exceptions, to receive the docked certificates, as they termed them, for pay, and employed counsel to protect and obtain their rights. The matter was taken before Judge Treat of the United States Court, at Springfield, by Hon. R. W. Wheatley, an attorney of Du Quoin, who succeeded it getting an order issued on Receiver Cavett to issue certificates for the full amount due within 10 days or pay the penalty for contempt of court for refusal. Many of the employés interested in the decision reside here, and the amount due aggregates $2,000."

San Antonio & Aransas Pass.—The grading of this road from San Antonio, Tex., to Floresville, 30 miles, is very nearly finished. Track-laying was commenced about two weeks ago, and the rails are reported down for 7 miles. A contract was let last week for the grading of the line from Floresville to Aransas, M. Johnson being the contractor. He agrees to complete 15 miles per month of grading after Oct. 1.

Sonora.—The statement of this Mexican road (controlled by the Atchison, Topeka & Santa Fe) for July and the seven months to July 31 is as follows, in Mexican currency:

	July.		Seven months.	
	1885	1884.	1885.	1884.
Earnings	$26.014	$17,380	$175,524	$130.451
Expenses	18,933	20,987	136,863	151,239
Net or deficit.	N.$7,081	D.$3,607	N.$38,661	D.$20,788

For the seven months the gross earnings increased $45,073, or 31.6 per cent., and the expenses decreased $14,376, or 9.5 per cent., leaving a total gain of $59,449 in net earnings.

South Pennsylvania.—The injunction suit against the transfer of this road was called up in Harrisburg, Pa., Sept. 8, before Judges Simonton and McPherson. Numerous counsel were present to represent the parties in interest. Solicitor-General Scott, of the Pennsylvania Railroad, stated that the numerous defendants had found it impracticable to confer with each other within the time allotted and were not now prepared to proceed. He moved for a continuance of the hearing. Attorney-General Cassidy, in assenting to the motion, said the commonwealth had expected to go on with the case then. He said he made this statement so that there might be a correction of an impression that had gone abroad that he meant to make an application for delay. He had never contemplated such a thing. The Court upon being assured that the defendants generally concurred in the application, set down the hearing for Sept. 29.

Terre Haute & Indianapolis.—This company has completed the work of reducing two of the most troublesome grades on the Logansport Division. Both grades have been cut down 10 ft. and the long trestle connecting them filled up. Other work of this kind is in progress at several points.

Texas & St. Louis.—The substance of the proposed plan of reorganization, aside from matters of detail and legal verbiage, is contained in the following sections:

3. To provide for the accomplishment of the intended purpose the committee may purchase the properties of the two present companies in their own names or in the name or names of others (using the stock and securities of the present companies to come to them in order to complete the purchase) at the approaching foreclosure sales, and in the event of such purchase by the committee, against such properties there shall be issued by the new companies, respectively, 6 per cent. 50-year first-mortgage bonds to the amount of $9,000 a mile (with the right in the companies respectively, subject to the control of the committee to increase to $13,000 a mile, for the purpose of widening to the regular gauge and altering the rolling stock then held to conform to such altered gauge); 6 per cent. 50-year second-mortgage bonds to the amount of $13,000 a mile, and capital stock to the amount of $13,000 a mile. The committee shall select the trustee or trustees for the mortgages securing the bonds and fix their compensation. The provisions of the bonds, mortgages and stock, and of the collateral trust certificates and all other papers herein provided for, shall be determined by the committee.

Bonds and stock at the rate herein provided may be issued with the consent of the committee upon all extensions of the present roads, the bonds to be secured *pro rata* by the respective mortgages.

5. The new Texas company shall issue stock to an amount equal to $13,000 a mile of road in Texas, in Arkansas and in Missouri.

7. The securities and stock of the two present companies held by subscribers and the cash deposit certificates held by them shall be provided for as follows:

Holders of readjustment trustees' cash deposit certificates shall receive, and they agree to accept therefor, an equivalent amount in first-mortgage collateral trust certificates.

Holders of first-mortgag bonds of the present Texas company shall receive, and they agree to accept therefor, 50 per cent. of the face amount in first-mortgage and 75 per cent. of the face amount in second-mortgage collateral trust certificates.

Holders of the first-mortgage bonds of the present Missouri & Arkansas company shall receive, and they agree to accept therefor, 105 per cent. of the face amount in second-mortgage collateral trust certificates and 30 per cent. of the face amount in stock trust certificates.

Holders of second-mortgage bonds of the present Missouri & Arkansas company shall receive, and they agree to accept therefor, 50 per cent. of the face amount in stock trust certificates.

Holders of the Texas company's general first mortgage bonds shall receive, and they agree to accept therefor, 50 per cent. of the face amount in second-mortgage collateral trust certificates and 75 per cent of the face amount in stock trust certificates.

Holders of the capital stock of the two companies shall receive, and they agree to accept therefor, 25 per cent of the face amount in stock trust certificates.

In none of the above cases shall any account be taken of interest.

8. To accomplish the intended purpose it is estimated that there will be required a special sum of $2,500,000 in cash.

To obtain such $2,500,000 all subscribers may pay to the committee cash upon the terms of receiving for each $1,000 of cash $1,200 in first-mortgage collateral trust certificates, $500 in second-mortgage collateral trust certificates and $500 in stock trust certificates.

If offers of cash shall be received in excess of $2,500,000, each subscriber shall have then the right to such proportion of $2,500,000 as the amount offered by him shall bear to the entire amount offered, and to receive collateral trust certificates and stock trust certificates therefor at the rate above mentioned.

9. If subscribers shall fail to offer the entire $2,500,000 at the rate above provided, the committee may raise the deficit, or any part of it, out of all unappropriated securities and stock trust certificates in its possession, upon terms and conditions, and at rates, to be approved by it.

10. The $2,500,000, or such part thereof as may be obtained, shall be used by the committee in the payment of expenses of the foreclosures, of their own expenses and of receiver's certificates issued in the foreclosures; in the betterment, further equipment and extension of the properties, and in the settlement or payment of demands which shall be claimed to constitute liens (other than mortgage liens), legal or equitable, against the properties; and the action of the committee in this regard shall be final and conclusive. Any residue may be used by the committee in paying for additional equipment and in meeting any payments which are herein contemplated, or which it shall think necessary for the accomplishment of the intended purpose. To meet any additional cash payments and to provide amounts necessary to pay non-subscribing stock and security holders, the committee may use all unappropriated securities and stock trust certificates at rates and upon terms and conditions to be approved by it.

Toledo, Ann Arbor & North Michigan.—This company recently received bids for the grading of 22 miles of new road, between Howell, Mich., and Durand. The contracts have not yet been awarded.

Toledo, Cincinnati & St. Louis.—An Indianapolis dispatch reports that on Sept. 4 Moses Bradford filed a cross bill in the suit of the Central Trust Co. of New York against the Toledo, Delphos & Burlington Railroad Co. asking that the consolidation with that road of the Frankfort, St. Louis & Toledo be declared null and void, and that the last named shall have the title quieted in it of that portion between Warren, Ind., and Kokomo, and that the Toledo, Cincinnati & St. Louis may bring into court $90,000 in bonds and $583,000 of stock so that the mortgage may be released and satisfied, and that he may be decreed to the ownership of 33 of the shares. If this is not done and the consolidation should be held to be legal, he asks that he may be given judgment against the Toledo, Cincinnati & St. Louis for $15,146.

At a meeting held in New York recently a committee was appointed to represent the creditors who are not bondholders. Mr. W. J. Craig, formerly receiver of the road, is chairman of the committee, and its object is to protect the interests of the floating debt creditors and to secure, if possible, something for them from the proceeds of the sale.

Toledo & Ohio Central.—Arrangements are being made for the transfer of this road to the Columbus, Hocking Valley & Toledo Co., under the agreement made some time ago. It is understood that the road will be managed directly by the officers of the Hocking Valley. As a preliminary to the transfer, a large number of cars owned by the company have been sold to the Baltimore & Ohio.

Troy & Greenfield.—The act passed by the Massachusetts Legislature providing for the sale of this road by the state to a consolidated corporation which was to operate the line from Boston to the Hudson River, provided that such corporation must be organized and the necessary certificates filed within three months from the date at which the act became a law. The three months expired Sept. 7, and no organization has been completed under the act, which consequently lapses and the whole question of the disposition of the state road and the tunnel will go over to the next Legislature. At the time of the passage of the act it was generally supposed that the Fitchburg Railroad Co. would take the necessary steps to form a consolidated corporation, but that company has done nothing towards that end.

Union Pacific.—The earnings of this road for July and the seven months to July 31 were as follows:

	July.		Seven months.	
	1885.	1884.	1885.	1884.
Gross earnings	$2,304,990	$2,375,899	$13,529,520	$13,369,716
Operat'g expens's	1,292,230	1,134,830	9,242,074	8,768,924
Net earnings	$1,012,760	$1,241,069	$4,287,446	$4,600,792

For the seven months gross earnings increased $159,804, or 1.2 per cent., and expenses $473,150, or 5.4 per cent., leaving a decrease of $313,346, or 6.8 per cent., in net earnings.

A dispatch from Boston, Sept. 9, says: "Important negotiations which for some time past have been quietly carried on between President Adams, of the Union Pacific Railroad Co., and representatives of certain leading Boston banking houses, were concluded to-day. Under the agreement reached the firms in question are to take a large amount of the bonds of the railroad company of various issues, paying cash therefor. Provision is also made for taking up $6,000,000 of outstanding floating securities of the company as they mature between now and the close of the year. None of the money thus furnished the company is for less than three years. It is understood, however, that a portion of it, if the company so elects, can be paid off at an earlier period. The average rate of interest will be something less than 5 per cent. The company agrees, for a certain length of time, to place no more of its securities, of the issue specified, on the market except at the request of the firms in question. This arrangement provides also for all the outstanding notes of the company and the balance of the floating debt, representing pay rolls, non-accrued coupons, and accounts with other railroad companies. The whole transaction amounts to a sale of bonds and a loan on collateral. Exactly what the aggregate amount secured is cannot be learned. Neither are the securities sold and pledged known, though it is presumed that they are St. Joseph & Western bonds, of which the company owns about $8,000,000. Besides these and besides the

sinking fund bonds and consols, there are plenty of securities of greater or less value which might be utilized."

Wabash, St. Louis & Pacific.—After several conferences between General Manager Talmage and the committee of the Knights of Labor, an agreement has finally been reached, which will, it is believed, prevent any further trouble. The members of the committee express themselves entirely satisfied with the settlement. As part of the agreement the General Manager issued the following order to his subordinates:

"In filling vacancies caused by the discharge of men for incompetency, or by their leaving the service, give the old men the preference over strangers or new men, asking no questions as to whether they belong to the Knights of Labor or any other organization."

Western Union Telegraph.—The statement for the quarter ending Sept. 30 is as follows:

Net earnings for the quarter		$1,450,000
Interest and sinking fund	$143,768	
Dividend, 1½ per cent	1,199,843	
		1,343,611
Surplus for the quarter		$106,389
Surplus, April 1		4,324.004
Surplus, July 1		$4,430,393

In this statement September net earnings are wholly and August partially estimated.

Wyandotte, Neb aska & Northwestern.—This company was organized a year ago. Recently a meeting of the incorporators was held, and it was resolved to make surveys at once of the line from Kansas City, northwest to Beatrice, Neb., about 150 miles.

ANNUAL REPORTS.

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Georgia Pacific	357	St. L., Iron Mountain & So.	528
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Connecticut & Passumpsic Rivers.

This company owns a line from White River Junction, Vt., northward to the Canada boundary at Derby Line, 110.3 miles. It controls and leases the Massawippi Railway, from Derby Line to the Grand Trunk road at Sherbrooke, P. Q., 34.7 miles, with a branch to Stanstead, P. Q., 2 miles, making 147 miles worked. The company also owns the Newport & Richford road, from Newport, Vt., to the Canada line, 32 miles, but leases that road to the Southeastern Railway Co., of Canada. The 40th annual report is for the year ending June 30 last.

The stock and bonds are as follows:

Stock	$2,241,600
Funded debt	1,850,000
Total	$4,091,600

The funded debt consists of $1,500,000 main line 7 per cent. bonds, and $350,000 Newport & Richford 5 per cent. bonds, the interest charge being $122,500 yearly. As rental for the Massawippi road the company pays 6 per cent. on $400,000 bonds and the same dividends on $400,000 stock as it pays on its own stock.

The traffic for the year was as follows:

Train miles:	1884–85.	1883–84.	Inc. or Dec.	P.c.
Passenger	273,732	275,059	D. 1,327	0.5
Freight	370,184	342,604	I. 27,580	8.0
Service	10,152	18,000	D. 7,848	43.6
Total	654,068	635,663	I. 18 405	2.9
Passengers carried	214,478	227,497	D. 13,021	5.7
Passenger-miles	7,876,120	8,060,667	D. 184,547	2.3
Tons freight	372,078	370,816	I. 1,262	0.3
Ton-miles	25,703,942	23,281,523	I. 2,422,419	10.4
Av. train load:				
Passengers, No	28.8	29.0	D. 0.2	0.7
Freight, tons	69.4	68.0	I. 1.4	2.1

There was a decrease in passenger and an increase in freight traffic, that in freight traffic being chiefly in through business at low rates.

The earnings for the year were:

	1884–85.	1883–84.	Inc. or Dec.	P. c.
Freight	$441,499	$449,285	D. $7,886	1.8
Passengers	273,178	307,289	D. 33,111	10.8
Other	82,849	82,266	I. 583	0.7
Total	$797,526	$837,940	D. $40,414	4.8
Expenses	498 111	538,789	D. 40,678	7.6
Net earnings	$299,415	$299,151	I. $264	0.1
Gross earn. per mile	5,425	5,700	D. 275	4.8
Net. " "	2,037	2,035	I. 2	0.1
Per cent. of exps	62.5	64.3	D. 1.8	....

The decrease in earnings was a little more than equaled by the reduction in expenses, the net earnings being very nearly the same in both years.

The income account is as follows:

Net earnings, as above		$299,415
Interest on bonds	$122,500	
Other interest, etc	17,141	
Rental Massawippi road	44,000	
Dividends, 5 per cent	112,080	
		295,721
Surplus for the year		$3.694
Balance from previous year		5,023
Surplus June 30, 1885		$8,717

One new locomotive and one saloon car have been added to the equipment. One thousand tons of steel rails and 69,483 new ties were laid during the year, and 1,500 tons of steel rails have been purchased and will be used in the following year. This will complete the track with steel rails the entire length of road from White River Junction to Sherbrooke. The report closes as follows:

"The falling off in passenger receipts is mainly owing to the decrease in the demand for operatives in the factories of New England, which have been supplied from Canada, and of whom large numbers have been brought over this road. On a revival of the manufacturing business we shall look for a return of the usual passenger traffic from that quarter. The decrease in freight receipts results from a reduction in rates of local freight on the line of road, made to correspond with reductions made by other competing roads. We hope, on the revival of business, that the increase on local freight will more than make good the loss by the reduction made in rates. It will be seen that the gross tonnage has increased over last year 1,262 tons. There has been no diversion of the business of the road to other channels, and, with a proper degree of economy in the management, we feel encouraged to look for as good or better results for the coming year. Our relations with all connecting roads remain friendly."

Chicago & West Michigan.

This company owns a line from La Crosse, Ind., to Pentwater, Mich., 208.74 miles, with 204.77 miles of branches; 413.51 miles in all. The chief branches are to White Cloud, 70 miles, and to Big Rapids, 51.20 miles. There are 294.60 miles laid with steel, and the road has 75.77 miles of sidings. The report is for the year 1884.

There were 3.23 miles of branch road built during the year, and a logging branch of 2.46 miles was abandoned and the track taken up, making a net increase of 0.77 mile of road.

The company has 46 locomotives. Additions to the car equipment last year were 50 box cars and 10 new hand cars.

The general account is as follows, condensed:

Stock		$6,796,800
Funded debt		3,822,500
Accounts and balances		160,085
Income account		234,996
Total		$11,014,381
Road and equipment	$10,044,821	
Charles Merrian, Trustee, stocks held	639,460	
Materials	105,269	
Accounts and balances	175,961	
Cash	49,770	
		11,014,381

The funded debt consists of $480,000 Chicago & Michigan Lake Shore first 8s.; $576,000 Grand Rapids, Newaygo & Lake Shore first 8s and $30,500 second 7s; $2,736,000 general mortgage 5s. The interest charge is $223,415 yearly.

The financial result of the year was as follows:

Net earnings, as shown below		$468,977
Interest on bonds (less interest received)	$219,869	
Dividends, 3½ per cent	215,257	
		435,126
Balance, surplus for the year		$33.851
Balance from previous year		108,892
Balance, total surplus		$142,743

Two dividends were paid, one of 2 per cent., Aug. 15, 1884, and one of 1½ per cent., Feb. 16, 1885.

Expenditures for additions to property were $162,499 for new construction and $28,211 for new equipment; a total of $190,710.

The earnings for the year were as follows:

	1884	1883.	Inc. or Dec.	P.c
Freight	$950,801	$1,026,938	D. $76,137	7.4
Passengers	451,927	466,053	D. 14.126	3.0
Mail, etc	66,939	57,108	I. 9,831	17.3
Total	$1,469,667	$1,550,099	D. $80,432	5.2
Expenses	1,000,690	1,185,224	D. 184,534	15.6
Net earnings	$468,977	$364,875	I. $104,102	28.5
Gross earn. per mile	3,554	3,756	D. 202	5.2
Net " "	1,134	884	I. 250	28.4
Per cent. of exps	68.1	76.5	D. 8.4	...

The considerable reduction made in expenses more than equaled the decrease in gross earnings, a substantial gain in net earnings being shown for the year.

The traffic for the year was as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Pass. train miles	634,838	522,192	I. 112,646	21.6
Freight train miles	564,786	611,279	D. 46,493	7.6
Total loco. miles	1,650,438	1,586,948	I. 63,490	4.0
Pass. car miles	1,866.744	1,561,210	I. 305,534	19.6
Freight car miles	9,177,387	9,095,592	I. 85,795	0.9
Passengers carried	616,514	659,301	D. 42,787	6.5
Passenger-miles	16,220 371	16,779,017	D. 558,646	3.3
Tons freight	947,502	1,102,309	D. 154,807	14.0
Ton-miles	58,836,985	61,317,920	D. 2,480,935	4.0
Av. train load:				
Passengers, No	25.5	32.1	D. 6.6	20.6
Freight, tons	104.2	100.3	I. 3.9	3 9
Average rate:				
Per pass.-mile	2.780 cts.	2.780 cts.	.....	....
Per ton-mile	1.599 "	1.675 "	D. 0.076 ct.	4.5

The earnings per train mile were $1.17 last year, against $1.36 in 1883. The average passenger journey last year was 26.3 miles; the average freight haul, 62.1 miles. Locomotive service cost 16.98 cents per mile run, a decrease of 15 per cent.

The report says: "The road-bed and track are being steadily improved; 3,000 tons of steel rails and 183,000 ties having been put in during the year 1884, the cost of which has been charged to operating expenses, less credit for old iron. The estimated requirements for 1885 are 1,500 tons of steel, and about the same number of ties as last year.

"The bonded debt was increased during the year by the sale of $35,000 of the 5 per cent. mortgage bonds of the company, the proceeds of which were used for terminal facilities at Muskegon and other charges for construction and equipment.

"All of the outstanding stock of the White River Railroad Co. having been exchanged in 1882 for bonds of the Chicago & West Michigan Railway Co., the former company has been dissolved, and the accounts representing its cost to this company have been closed by transfer to construction account."

Flint & Pere Marquette.

This company owns a line from Monroe, Mich., to Ludington, 253.34 miles, with 108.30 miles of branches; a total of 361.64 miles of road, with 178.89 miles of sidings and logging spurs. This makes a total of 540.53 miles of track, of which 369.91 miles are laid with steel rails. There was in 1884 an increase of 0.33 mile of branch line and 3.82 miles of sidings.

The equipment consists of 78 locomotives; 53 passenger, 6 parlor, 5 sleeping and 17 baggage, mail and express cars; 1,023 box, 8 stock, 200 coal, 921 flat and 37 caboose cars; 1 officers' car, 3 snow-plows and 16 service cars; 188 hand and push cars.

The general account is as follows, condensed:

Stock		$6,500,000
Funded debt		5,299,000
Accounts and balances		845,065
Profit and loss		13,365
Total		$12,657,430
Road and equipment	$11,352,492	
Stocks and other property	801,608	
Materials	148,126	
Accounts and balances	239,892	
Cash	115 312	
		12 657,430

The funded debt includes $1,000,000 Holly, Wayne & Monroe 8s; $300,000 Flint & Holly lease 10s; $75,000 Bay County 10s and $3,924,000 general mortgage 6s.

Road-bed and equipment account has been reduced during the year by the application of premium on bonds sold and of amounts received from the trustees of the land department since the reorganization of the company, Oct. 1, 1880, and used for extensions and betterments, the aggregate being $1,105,277. The former method of keeping this account was found confusing. The figures now show the net cost of the property, after deducting receipts from land grant and premiums from sales of bonds.

The disbursements on account of construction by the reorganized company up to the close of 1883 were $488,851, and up to the close of 1884 were $632,998. For this construction $102,000 in bonds were sold, upon which there was a premium received of $9,945, and there were, besides, miscellaneous receipts credited to construction of $12,368, leaving a balance at the close of 1884 of $508,685—the "excess expended on construction over avails of bonds."

Under "equipment renewal" the report says that "a special account was opened, showing $142,000 expended, under orders of the board, in the spring of 1884, for 8 new freight engines and 200 coal cars. The funds for the purchase were raised by loan, which is being paid at the rate of $3,000 per month, and the sums so paid are charged to operating expenses. The intention is, if earnings permit, to extinguish the entire amount, principal and interest, within four years, so that this addition to rolling stock shall not involve any increase of construction account."

The land report shows sales for 1884 of 2,650 acres for (including timber) $24,826. The average price per acre was $8.88. The amount collected in 1884 was $146,952, on account of principal, and $35,427 on account of interest. Bills receivable on hand at the close of the year were for principal $445,858, and for interest $46,476.

The earnings for the year were:

	1884.	1883.	Inc or Dec.	P. c.
Freight	$1,457,169	$1,610,511	D. $153,342	9.5
Passengers	735,067	874,641	D. 139.574	16.0
Mail, etc	60,752	57,792	I. 2,960	5.1
Total	$2,252,988	$2,542,944	D. $289,956	11 4
Expenses	1 515,461	1,735,518	D. 220,057	12.7
Net earnings	737,527	$807,426	D. $69,899	8.7
Gross earn. per mile	6,230	7,330	D. 1,100	15.0
Net " "	2,039	2,328	D. 289	12.6
Per cent. of exps	67.3	68.3	D. 1.0	.....

In 1883 there was a remarkable increase in traffic, and in 1884 there was an equally remarkable decrease, which has continued into the current year.

Renewals last year included 28.60 miles of steel rails and 173,277 new ties. The usual improvements of road and equipment were made, and the Mt. Pleasant Branch, 15.02 miles, was changed from 3 ft. to standard gauge.

The result of the year was as follows:

Net earnings, as above		$737,527
Interest received		11,922
Total		$749,449
Interest paid	$349,146	
Dividends paid	455,000	
		804,146
Excess of payments		$54,697
Balance, Jan. 1, 1884		69,368
Balance, surplus, Dec. 31, 1884		$14,671

Two dividends of 3½ per cent. each were paid on the stock, making 7 per cent. for the year.

The traffic for the year was as follows:

Train miles:	1884.	1883.	Decr ase.	P.c.
Passenger	738,321	740,760	2,439	0.3
Freight	871,496	1,045,888	174.392	16.7
Other	561,756	744,877	183,121	24.6
Total	2.171,573	2,531,525	359,952	14.2
Passengers carried	882,659	1.048,496	165,837	15.7
Passenger-miles	27,231,295	32,213,590	4,982,295	15.4
Tons freight	1.229,679	1,442,884	213,205	14.8
Ton-miles	97.972,254	123,112,615	25,140,361	20.4
Av. train load:				
Passengers, No	36.9	43.0	6.1	14.2
Freight, tons	112.4	118.0	5.6	4.7

The average rate per ton-mile last year was 1.388 cents. The earnings per train-mile were $1.33; expenses, $0.94; net earnings, $0.39.

Of the tonnage, 27 per cent. was lumber and forest products, 34 per cent. logs, 7 per cent. coal and 9 per cent. salt.

The company withdrew from through traffic to Milwaukee soon after January, 1884, on account of low and unremunerative rates, and did not resume until November. The boats were used for local freight and passenger traffic. Their earnings were $79,117 gross and $11,123 net. On the last day of the year steamer No. 1 was wrecked and damaged to the extent of $10,000, but the total net loss to the vessel and by destruction of cargo was between $30,000 and $35,000. Lake traffic for the first three months of 1885 was practically suspended.